Clinical guidelines

Diagnosis
and treatment manual

for curative programmes
in hospitals and dispensaries

guidance for prescribing

2010 EDITION

© Médecins Sans Frontières – January 2010
All rights reserved for all countries. No reproduction, translation and adaptation may be done without the prior permission of the Copyright owner.
ISBN 2-906498-81-5

Clinical guidelines

Diagnosis and treatment manual

Editorial Committee:

I. Broek (MD), N. Harris (MD), M. Henkens (MD), H. Mekaoui (MD), P.P. Palma (MD), E. Szumilin (MD) and V. Grouzard (N, general editor)

Contributors:

P. Albajar (MD), S. Balkan (MD), P. Barel (MD), E. Baron (MD), M. Biot (MD), F. Boillot (S), L. Bonte (L), M.C. Bottineau (MD), M.E. Burny (N), M. Cereceda (MD), F. Charles (MD), M.J de Chazelles (MD), D. Chédorge (N), A.S. Coutin (MD), C. Danet (MD), B. Dehaye (S), K. Dilworth (MD), F. Fermon (N), B. Graz (MD), B. Guyard-Boileau (MD), G. Hanquet (MD), G. Harczi (N), M. van Herp (MD), C. Hook (MD), K. de Jong (P), S. Lagrange (MD), X. Lassalle (AA), D. Laureillard (MD), M. Lekkerkerker (MD), J. Maritoux (Ph), J. Menschik (MD), D. Mesia (MD), A. Minetti (MD), R. Murphy (MD), J. Pinel (Ph), J. Rigal (MD), M. de Smet (MD), S. Seyfert (MD), F. Varaine (MD), B. Vasset (MD)

(S) Surgeon, (L) Laboratory technician, (MD) Medical Doctor, (N) Nurse, (AA) Anaesthetist-assistant, (Ph) Pharmacist, (P) Psychologist

We would like to thank the following doctors for their invaluable help: O. Bouchaud, E. Bottieau, A. Briend, M. Boussinesq, F. Chappuis, J.P. Chippaux, J. Dupouy Camet, F. Delange, O. Fontaine, P.Y. Fournier, F. Van Gompel, M. Goyffon, S. Halperin, J. Janin, B. Lagardère, J.D. Law-Koune, F. Nosten, G. Potel, M. Rosenheim, J. Ross, C.E. Rupprecht, J. Saló Raïch, P. Pérez Simarro, M. Soriano, K. Stille, T. Vallot, P. Vigeral, M. Warrell, A.Weissman and N. White.

Translated from French by K. Alberti, V. Grouzard, N. Harris and C. Lopez-Serraf

Illustrations: Germain Péronne

Design and layout: Evelyne Laissu

Foreword

This diagnostic and treatment manual is designed for use by medical professionals involved in curative care at the dispensary and hospital levels.

We have tried to respond in the simplest and most practical way possible to the questions and problems faced by field medical staff, using the accumulated field experience of Médecins Sans Frontières, the recommendations of reference organizations such as the World Health Organization (WHO) and specialized works in each field.

This edition touches on the curative and, to a lesser extent, the preventive aspects of the main diseases encountered in the field. The list is incomplete, but covers the essential needs.

This manual is used not only in programmes supported by Médecins Sans Frontières, but also in other programmes and in other contexts. It is notably an integral part of the WHO Emergency Health Kit.

Médecins Sans Frontières has also issued French and Spanish editions. Editions in other languages have also been produced in the field.

This manual is a collaborative effort of medical professionals from many disciplines, all with field experience.

Despite all efforts, it is possible that certain errors may have been overlooked in this manual. Please inform the authors of any errors detected. It is important to remember, that if in doubt, it is the responsibility of the prescribing medical professional to ensure that the doses indicated in this manual conform to the manufacturer's specifications.

The authors would be grateful for any comments or criticisms to ensure that this manual continues to evolve and remains adapted to the reality of the field.

Comments should be addressed to:

Médecins Sans Frontières - Guidelines
4 rue St-Sabin - 75011 Paris
Tel.: +33.(0)1.40.21.29.29
Fax: +33.(0)1.48.06.68.68
e.mail: guide.clinical@msf.org

This manual is also available on the internet at www.msf.org. As treatment protocols for certain diseases are constantly changing, medical staff are encouraged to check this website for updates of this edition.

How to use this manual

Organization

There are two easy ways to find information in this manual:

– The ***table of contents*** at the beginning of the manual with the number and title of each chapter, their subsections and page numbers.

– An ***alphabetical index*** at the end of the manual with the names of the diseases and symptoms.

Names of drugs

The International Non-proprietary Name (INN) of drugs is used in this manual. A list of current proprietary names can be found at the end of the manual.

Abbreviations used

Units

kg	=	kilogram
g	=	gram
mg	=	milligram
µg	=	microgram
IU	=	international unit
M	=	million
mmol	=	millimole
ml	=	millilitre
dl	=	decilitre

Administration route

PO	=	per os = oral
IM	=	intramuscular
IV	=	intravenous
SC	=	subcutaneous

For certain drugs

NSAID = nonsteroidal anti-inflammatory drug

SMX + TMP = sulfamethoxazole + trimethoprim = cotrimoxazole

Expression of doses

– Doses of the combination sulfamethoxazole + trimethoprim (cotrimoxazole) are expressed as SMX + TMP, for example:
Children: 30 mg SMX + 6 mg TMP/kg/day
Adults: 1600 mg SMX + 320 mg TMP/day

– Doses of the combination amoxicillin + clavulanic acid (co-amoxiclav) are expressed in amoxicillin.

– Doses of certain antimalarial drugs are expressed in base (and not in salts).

– Doses of iron are expressed in elemental iron (and not in ferrous salts).

Table of contents

Introduction page 8

1 A few symptoms and syndromes page 15

Shock (17) Seizures (23) Fever (26) Pain (29) Anaemia (37) Severe acute malnutrition (40)

2 Respiratory diseases page 47

Rhinitis and rhinopharyngitis [common cold] (49) Acute sinusitis (50) Acute laryngitis (51) Acute pharyngitis (53) Diphtheria (55) Otitis (57) Whooping cough [pertussis] (60) Bronchitis (62) Bronchiolitis (64) Acute pneumonia (66) Staphylococcal pneumonia (72) Asthma (73) Pulmonary tuberculosis (78)

3 Gastrointestinal disorders page 81

Acute diarrhoea (83) Shigellosis (86) Amoebiasis (88) Disorders of the stomach and duodenum (89) Stomatitis (92)

4 Skin diseases page 95

Dermatology (97) Scabies (98) Lice [pediculosis] (101) Superficial fungal infections (103) Bacterial skin infections (105) Cutaneous anthrax (109) Treponematoses (111) Leprosy (113) Herpes simplex and herpes zoster (116) Other skin disorders (117)

5 Eye diseases page 119

Xerophthalmia [vitamin A deficiency] (121) Conjunctivitis (123) Trachoma (126) Other pathologies: onchocerciasis, loiasis, pterygium, cataract (128)

6 Parasitic diseases page 129

Protozoan infections: Malaria (131) Human african trypanosomiasis (139) American trypanosomiasis (142) Leishmaniases (144) Intestinal protozoan infections [parasitic diarrhoea] (147)
Helminthic infections: Flukes (149) Schistosomiasis (150) Cestodes (152) Nematode infections (154) Filariasis (157)

7 Bacterial diseases page 163

Bacterial meningitis (165) Tetanus (170) Typhoid fever (174) Brucellosis (176) Plague (178) Leptospirosis (180) Relapsing fever [borreliosis] (182) Eruptive rickettsioses (185)

8 **Viral diseases** **page 187**

Measles (189) Poliomyelitis (192) Rabies (194) Viral hepatitis (198) Dengue fever (201) Viral haemorrhagic fevers (204) HIV infection and AIDS (207)

9 **Genito-urinary diseases** **page 221**

Uro-nephrologic diseases:
Urolithiasis (223) Acute cystitis (224) Acute pyelonephritis (226) Acute prostatitis (228)

Genital infections (GI) (229):
Urethral discharge (231) Abnormal vaginal discharge (233) Genital ulcers (236) Lower abdominal pain in women (239) Upper genital tract infections (240) Veneral warts (243) Major genital infections - summary (244)

Metrorrhagia (246)

10 **Medical and minor surgical procedures** **page 251**

Dressings (253) Treatment of a simple wound (256) Burns (266) Abscesses (274) Pyomyositis (279) Leg ulcers (281) Venomous bites and stings (283) Dental infections (287)

11 **Other conditions** **page 289**

Hypertension (291) Heart failure (294) Endemic goitre and iodine deficiency (297) Psychological disorders (298)

Annexes **page 303**

The interagency emergency health kit/Annex 2 - WHO (305) Practical advice for writing medical certificates in the event of sexual violence (312) List of the drugs mentioned in this guide, including the INN as well as the most common synonyms and proprietary names (315)

Main references **page 318**

Index **page 320**

Introduction

Curative care is one component of health programmes. It is important to remember that the other components also need to be developed. These components include programmes focusing on: palliative care (including pain control), psychological support, prevention (including the Expanded Programme of Immunization (EPI), maternal-child health etc.), nutrition, water, hygiene and sanitation.

I - The objectives of curative care programmes

– *At an individual level*: to cure the patient of disease and to minimize or prevent the consequences for the individual and those in close contact (i.e. preventing transmission when possible).
– *At a population level*: to reduce the mortality and the consequences of morbidity of the most prevalent and important diseases in the population.
– *For certain endemic diseases* (tuberculosis, leprosy, trypanosomiasis etc.): curative care can reduce transmission if a large enough proportion of the population is treated. Often, this objective is only achieved through specific control programmes which are not extensively discussed in this manual.

II - Strategy

When defining a strategy for a medical intervention, medical decision makers must take into account the priority diseases: those with the highest frequency and mortality.
Priority diseases vary with context (conflict, natural disasters, etc.) and geographical region. Nevertheless, there is a relatively standard epidemiological profile with quantitative variations. An initial assessment, both qualitative (disease distribution) and if possible quantitative (mortality, incidence, prevalence and case fatality), is still necessary. This evaluation identifies the most common diseases (diarrhoea, measles, acute respiratory tract infections, malaria, wounds etc.) and the population groups exposed and at risk (children under 5 years, pregnant women).
These diseases and populations constitute the priority 'targets' of a programme.
For rehabilitation programmes and programmes to support pre-existing health structures, detailed information is sometimes available from the health structures or from the Ministry of Health. The evaluation consists of assessing the information available and filling in any missing data.
In very isolated contexts or when there is population displacement, no information is available and it is always necessary to do a complete assessment.
Once the priority diseases are identified and health policy, means and resources (list of essential drugs, Ministry of Health protocols, staff and level of training, health services, functioning programmes etc.) are known, programmes can be defined and initiated.
This manual and the manual, *Essential drugs – practical guidelines*, are tools to help in the definition and implementation (protocols, training, retraining) of curative programmes.

III - Means to consider and measures to develop

In certain situations (displaced populations, refugees), entire systems must be created. In other situations, an existing system is evaluated and may be supported if necessary.

Infrastructure and health staff

The training and competence level of medical staff (medical auxilaries, medical assistants, nurses, midwives, doctors etc.) vary by country and health structure (health post, dispensary, health centre, hospital).
Evaluation should identify their technical level while recognising that in some situations, the staff have not always received prior training.

Drugs

Selection of drugs depends on the priorities and needs, but also on other criteria:
– effectiveness, local resistance, adverse effects
– administration route, length of treatment, number of doses per day, expected compliance
– stability, availability, price
The WHO Essential Medicines List is the basic framework, but the choice of drugs has to be adapted to the epidemiological profile, the competence of the staff and the possibility (or lack thereof) to refer very sick patients.

Certain drugs proposed in this manual are not included in the WHO Essential Medicines List.

Treatment protocols

Standard protocols improve diffusion and use of effective treatment. They should:
– give precise instructions (INN of the medication, indications, dosage, route of administration, length of treatment, contra-indications, adverse effects, precautions);
– favour the most effective drug with the least adverse effects;
– be supported by clinical, epidemiological and scientific data and be discussed and agreed upon by the users;
– be practical, simple, understandable and adapted to the field;
– facilitate the training and retraining of medical staff;
– facilitate the organization of health services (e.g. management, pharmacy);
– be evaluated.

The treatment protocols include drug prescription, as well as other measures (curative and preventive), indications for referral to a higher level of care and an indication of which diseases must be reported (cholera, measles etc.).

Formulation depends on the training of the prescribing medical staff: doctors are trained in terms of diseases (pneumonia, malaria etc.) while medical auxilaries use a symptomatic approach (cough and difficulty in breathing, fever and chills etc.).

Protocols must take into account the cultural context (e.g. to discourage covering a febrile child if that is the cultural practise) and the environment (avoid the classic mistakes, e.g. recommending that water be boiled when fuel or firewood is scarce).

The protocols must take into account drug supply (what is the availability?) and presentation (e.g. are the antimalarials labelled in salts or base?).

Protocols must facilitate compliance. Short treatments with few doses are recommended. Single dose treatment, when indicated, is the best choice. The number of different drugs prescribed must also be limited whenever possible. For similar effectiveness oral or rectal drugs are preferred over injections in order to reduce complications, cost, risk of transmission of hepatitis B, HIV etc.

Diagnostic methods

The methods used depend on the services available and the technical level of the staff. They have a direct influence on the establishment of protocols and the content of the drug list. Usually diagnosis is made on a basis of history taking, clinical examination and basic laboratory tests (as defined by the WHO).

A - History taking

A medical consultation is a special occasion to listen to the patient and to ask relevant questions to determine the cause of the complaint.
During the interview, the history of the current illness, the signs and symptoms, prior illness and any treatment already received are specified.
Only by listening attentively is it possible to put the patient's complaint in a larger context of suffering. For example, during a consultation, physical violence, sexual violence or abuse may come to light, while this type of complaint is rarely expressed spontaneously by the victim. It is the clinician's responsibility to take a global view of the situation that includes: psychological, legal (completing a medical certificate) and social aspects and direct clinical care.

B - Clinical examination

Clinical examination is essential: the diagnosis and treatment depend directly on it's quality. It is important to know or to learn a technique of clinical assessment that is both complete and rapid, keeping in mind the need for quality and efficiency. A technique, or a strategy, is even more important in field conditions as the number of patients often stretches the medical possibilities and apart from basic laboratory examinations, the complementary examinations are often nonexistent.
The following examination framework is an example that should be adapted to each case. It emphasises the advantages of a systematic approach.

Context of the examination

– Routine examination: e.g. prenatal consultation or Mother and Child Health (MCH). The emphasis of the examination is predefined by the programme objectives (nutritional state, anaemia, prevention of tetanus etc.).
– As a result of a complaint: the usual situation at a dispensary. The most common complaints are fever, pain, diarrhoea and cough.

A few rules

– A systematic approach reduces omissions and saves time.
– An interpreter may be needed; however, translation does not always accurately reflect the complaints of the patient. Learning the names of the main clinical signs and common diseases in the local language helps overcome this problem. The choice of an interpreter must take into consideration the sex (e.g. a female for gynaecology and obstetrics) and the acceptability by the patient (respecting confidentiality).

The examination

– *Physical examination*: the patient should be undressed if possible.
  • first look at the general condition of the patient in order to judge the severity of illness: nutritional status (weight and, in children, height), hydration, anaemia, temperature.
  • examine each system: use a systematic approach starting with the system related to the patient's complaint.
– *Laboratory examinations*: if necessary and if available
– *Imaging techniques*: x-ray and ultrasonography, if necessary and if available

C - Role of the laboratory

A basic medical laboratory can play an important and irreplaceable role. However, technical constraints (the need for a trained and competent technician), logistical constraints (regular supply of material, reagents, electricity), time constraints (each examination takes a minimum time) and quality constraints (which depends on all the points just mentioned) should not be underestimated.
Two levels of examinations can be defined:

Basic examination

Blood	*Haematology* • haemoglobin (Lovibond) • WBC and differentials *Transfusion* • blood group + rhesus • HIV, hepatitis B and C, syphilis RPR *Thick and thin films* • malaria, some filariases, trypanosomiasis, visceral leishmaniasis, borreliosis *Rapid tests* • malaria • HIV, hepatitis B and C etc.
Sputum	Koch's bacillus
Urine	reagent strip test (glucose, protein)
Genital discharge	gonococcus, trichomonas
Stool	• examination of wet preparation (eggs, helminths, cysts, protozoa) • scotch-test
CSF	• look for and identify pathogens (including rapid test for meningitis) • cell count and protein (Pandy test)

More specific examinations are defined in relation to the programme.

A laboratory can be used in three complementary ways:

– *Clinically*: examinations are requested for individuals depending on the clinical picture. The aim is to orient a diagnosis (e.g. leucocytosis in a full blood count) or to determine or eliminate an aetiology (e.g. stool examination for parasites, blood smear, rapid test).
– *Epidemiologically*: the objective is to facilitate diagnosis and treatment. By studying a sample of patients presenting with similar clinical profiles an aetiology can be specified. The validity (sensitivity and specificity) of the particular symptoms or syndrome can also be studied. Through these means appropriate treatment protocols can be introduced for all patients presenting with the same symptoms or syndrome.
  For example: is the syndrome non-febrile bloody diarrhoea predictive of amoebic dysentery? An investigation of approximately 100 patients will answer this question. If a significant proportion of the samples are positive, an appropriate treatment can be given to all patients presenting with this syndrome. This approach, while practical during some epidemics, should not stop the practitioner from considering differential diagnosis as the sensitivity of a syndrome is rarely 100%
– *Operational research*: laboratory examinations are also used during resistance studies (malaria) and for other operational research.

The combination of **clinical examination** and **complementary examinations** should result in an aetiological diagnosis if possible, if not, a symptomatic or syndromic diagnosis.

Treatment

Prescribe a treatment:
– aetiological (treat the cause)
– symptomatic
– give relevant advice, whether or not the patient was treated
or refer.

Recording data and the individual patient record

Record the essential information in a register and on an individual patient record (see the example of a health card, annex 3), an examination card or in a family health booklet. Information should include:
– diagnosis is important positive and negative signs (e.g. bloody diarrhoea without fever)
– laboratory examinations requested and the results
– drugs prescribed (in INN), dosage, duration

Training

Training and retraining of staff should be carried out according to their technical level (this should be evaluated) and is therefore context dependent. This manual and other documents may be useful tools in defining and meeting training objectives.

Public awareness and dissemination of information

For many reasons (lack of information, different cultural perceptions), a significant proportion of seriously ill, but curable patients may not present at health centres for treatment, or may present only when they are in the advanced stages of disease. Public awareness and dissemination of information at all levels, along with the quality of services, contribute to increase the proportion of the population receiving appropriate care.

IV - Organization and management

They are related to the services and resources available.

V - Programme evaluation

Programme evaluation is carried out at different levels:

Functioning

Assessment of activities, trends in case fatality rates, respect of protocols, management of the pharmacy, drug consumption, quality of prescriptions, orders, reports, the register etc.
This information helps in programme management (orders, staffing). The morbidity data collected at the dispensary level and their analysis contribute to epidemiological surveillance. Trends of priority diseases by person, time and place can be monitored (see *Epidemiological reports*, annex 2) and an early warning systems can be put in place.

Coverage of need

This depends on the accessibility and on the population's perception of the health care system. The goal is to determine the proportion of sick people who are actually being treated. The evaluation is feasible by surveying representative samples of the population (see below).

Impact on the population

The evaluation is complex. It refers to the objectives of reducing mortality, morbidity, etc. Survey protocols exist but are very difficult to put into practice (large sample size) and the surveys must be repeated to show trends.

CHAPTER 1

A few symptoms and syndromes

Shock 17

Seizures 23

Fever 26

Pain 29

Anaemia 37

Severe acute malnutrition 40

Shock

Acute circulatory failure leading to inadequate tissue perfusion which, if prolonged, results in irreversible organ failure. Mortality is high without early diagnosis and treatment.

Aetiology and pathophysiology

Hypovolaemic shock

– **Absolute hypovolaemia** by significant intravascular fluid depletion:
  • Internal or external haemorrhage: post-traumatic, peri or postoperative, obstetrical (ectopic pregnancy, uterine rupture etc.), blood loss due to an underlying condition (gastrointestinal ulcer etc.). A loss of 30 to 50% of blood volume will lead to haemorrhagic shock
  • Dehydration: severe diarrhoea and vomiting, cholera, intestinal obstruction, diabetic ketoacidosis or hyperosmolar coma etc.
  • Plasma leaks: extensive burns, crushed limbs etc.
– **Relative hypovolaemia** due to acute vasodilation without concomitant increase in intravascular volume:
  • Anaphylactic shock with extreme vasodilation: allergic reaction to insect bites or stings; drugs, principally antibiotics, acetylsalicylic acid, neuromuscular blockers, colloid solutions (dextran, modified gelatin fluid); equine sera; vaccines containing egg protein; food etc.
  • Acute haemolysis: severe malaria, drug poisoning (rare)

Septic shock

By a complex mechanism often including vasodilation, heart failure and absolute hypovolaemia.

Cardiogenic shock

By decrease of cardiac output:
– Direct injury to the myocardium: infarction, contusion, trauma, poisoning or drug toxicity
– Indirect mechanism: arrhythmia, constrictive pericarditis, haemopericardium, pulmonary embolism, tension pneumothorax, valvular disease, severe anaemia, beri beri etc.

Clinical features

Signs common to most forms of shock

– pallor, mottled skin, cold extremities, sweating, thirst
– rapid and thready pulse often only detected on major arteries (femoral or carotid)
– low blood pressure (BP), narrow pulse pressure, BP sometimes undetectable
– cyanosis, respiratory signs (dyspnoea, tachypnoea) are often present in varying degrees depending on the mechanism
– consciousness may be maintained, but anxiety, confusion, agitation or apathy are common
– oliguria or anuria

Signs specific to the mechanism of shock

– **Hypovolaemic shock**
  The common signs of shock listed above are typical of hypovolaemic shock.
  Warning: do not underestimate hypovolaemia. Signs of shock may not become evident until a 50% loss of blood volume.

– **Allergic or anaphylactic shock**
  • significant and sudden drop in BP
  • tachycardia +++
  • frequent cutaneous signs, rash, urticaria, Quincke's oedema
  • possible respiratory signs, dyspnoea or bronchospasm

– **Septic shock**
  • high fever, or rarely, hypothermia (< 36°C), rigors, confusion
  • in the initial phase the BP may be maintained, but rapidly follows the same pattern as for hypovolaemic shock

– **Cardiogenic shock**
  • Respiratory signs of left ventricular failure (acute pulmonary oedema) are dominant: tachypnoea, crepitations on ausculation
  • Signs of right ventricular failure: raised jugular venous pressure, hepatojugular reflux, sometimes alone, more often associated with signs of left ventricular failure

The **aetiological diagnosis** is oriented by:
– the context: trauma, insect bite, ongoing medical treatment etc.
– the clinical examination:
  • skin pinch consistent with dehydration
  • thoracic pain from a myocardial infarction or pulmonary embolus
  • abdominal pain or rigidity of the abdominal wall from peritonitis, abdominal distension from intestinal obstruction
  • bloody stool, vomiting blood
  • subcutaneous crepitations, likely anaerobic infection
  • fever

Treatment

Symptomatic and aetiological treatment must take place simultaneously.

All cases

– Emergency +++: immediate attention to the patient.
– Lay the patient flat, warm the patient, elevate legs (except in acute pulmonary oedema).
– Insert a peripheral IV line using a large calibre catheter (16G in adults).
– Oxygen therapy, assisted ventilation in the event of respiratory distress.
– Assisted ventilation and external cardiac compression in the event of cardiac arrest.
– Intensive monitoring of: consciousness, pulse, BP, respiratory rate, hourly urinary output (insert an urinary catheter) and skin mottling.

Specific causes

– **Haemorrhage**

- Control bleeding (compression, tourniquet, surgical haemostasis)
- Determine blood group
- Priority +++: restore vascular volume as quickly as possible
  Insert 2 peripheral IV lines using large calibre catheters (16G in adults) with **plasma substitute**: replace 1.5 times the estimated losses
  and/or
  Ringer Lactate or **0.9% sodium chloride**: replace 3 times the estimated losses
- Transfuse: classically once estimated blood loss represents approximately 40% of blood volume or if haematocrit is < 20%.
  First, verify blood group (as a default give O negative) and ensure screening for HIV, hepatitis B and C etc.
  In the absence of HIV and hepatitis B and C screening, see *Note*, page 38.

– **Acute dehydration**

Administer preferably **Ringer Lactate** or, if not available, **0.9% sodium chloride**.

For information:
Children under 1 year: 100 ml/kg over 6 hours according to the following protocol:
30 ml/kg the first hour followed by 70 ml/kg over the following 5 hours

Children over 1 year and adults: 100 mg/kg over 3 hours according to the following protocol:
30 ml/kg over 30 minutes followed by 70 ml/kg over the following 2 1/2 hours.

In practice, only reduce the IV rate once the patient has recovered pulse, BP and consciousness. Be careful to avoid fluid overload in young children and the elderly.

Note: in severely malnourished children the IV rate and solution are different than those for healthy children (see *Severe acute malnutrition*, page 40).

– **Anaphylactic shock**

- Determine the causal agent
- Stop any injections or infusions in course, but if in place, maintain the IV line
- **epinephrine** (**adrenaline**) is the treatment of choice:
  Children: dilute 0.25 mg in 9 ml of water for injection and inject by direct IV, ml by ml, until normal BP is reached and tachycardia is reduced.
  Adults: dilute 1 mg in 9 ml of water for injection and inject by direct IV ml by ml until a normal BP is reached and tachycardia is reduced.

  If it is impossible to find IV access, epinephrine may be given sublingually at the same doses as by IV. In less severe cases, it can also be given SC: 0.3 to 0.5 mg to be repeated every 5 to 10 minutes if necessary.

  In the event of persistent shock, administration of IV epinephrine at a constant rate by a syringe pump (see final box) may be necessary for 6 to 24 hours: 0.1 to 0.5 microgram/kg/minute according to the clinical evolution.
- Fluid replacement with **Ringer Lactate** or **0.9% sodium chloride**

- Corticosteroids have no effect in the acute phase. However, they must be given once the patient is stabilized to prevent recurrence in the short term
  hydrocortisone hemisuccinate IV or IM
  Children: 1 to 5 mg/kg/24 hours in 2 or 3 injections
  Adults: 200 mg every 4 hours
- In patients with bronchospasm: epinephrine is effective. If the spasm persists give 10 puffs of inhaled **salbutamol**.
- Special situation: to prevent placental vasoconstriction in pregnant women, first use high dose **ephedrine**: 25 to 50 mg IV. If there is no immediate improvement, use **epinephrine** (adrenaline) at the doses given above.

– **Septic shock**

- Vascular fluid replacement with **plasma substitute** or **Ringer Lactate** or **0.9 % sodium chloride**
- Use of vasoconstrictors:
  dopamine IV at a constant rate by syringe pump (see final box): 10 to 20 micrograms/kg/minute
  or, if not available
  epinephrine (**adrenaline**) IV at a constant rate by syringe pump (see final box): from 0.1 microgram/kg/minute. Increase the dose progressively until a clinical improvement is seen.
- Look for the origin of the infection (abscess; ENT, pulmonary, digestive, gynaecological or urological infection etc.)
- Antibiotic therapy according to the origin of infection:

Origin	Antibiotic therapy	Alternative
Cutaneous staphylococci, streptococci	cloxacillin + gentamicin	
Pulmonary pneumococci, *Haemophilus influenzae*	ampicillin or ceftriaxone +/- gentamicin	co-amoxiclav or ceftriaxone + ciprofloxacin
Intestinal or **biliary** enterobacteria, anaerobic bacteria, enterococci	co-amoxiclav + gentamicin	ceftriaxone + gentamicin + metronidazole
Gynaecological streptococci, gonococci, anaerobic bacteria, *E. coli*	co-amoxiclav + gentamicin	ceftriaxone + gentamicin + metronidazole
Urinary enterobacteria, enterococci	ampicillin + gentamicin	ceftriaxone + ciprofloxacin
Other or undetermined	ampicillin + gentamicin	ceftriaxone + ciprofloxacin

ampicillin IV
Children and adults: 150 to 200 mg/kg/day in 3 injections (every 8 hours)

cloxacillin IV
Children: 100 mg/kg/day in 3 injections (every 8 hours)
Adults: 3 g/day in 3 injections (every 8 hours)

co-amoxiclav (**amoxicillin** + **clavulanic acid**) slow IV
Children: 75 to 150 mg/kg/day in 3 injections (every 8 hours)
Adults: 3 g/day in 3 injections (every 8 hours)

ceftriaxone slow IV[1]
Children: 100 mg/kg as a single injection on the first day, then 50 mg/kg/day the following days
Adult: 2 g once daily

ciprofloxacin PO (by nasogastric tube)
Children: 15 to 30 mg/kg/day in 2 divided doses
Adult: 1500 mg/day in 2 divided doses

gentamicin IM
Children and adults: 3 to 6 mg/kg/day in 1 or 2 injections

metronidazole IV
Children: 20 to 30 mg/kg/day in 3 infusions (every 8 hours)
Adults: 1 to 1.5 g/day in 3 infusions (every 8 hours)

- Corticosteroids: not recommended, the adverse effects outweigh the benefits

– **Cardiogenic shock**

The objective is to restore efficient cardiac output. The treatment of cardiogenic shock depends on its mechanism.

- ***Acute left heart failure with pulmonary oedema***

  Acute pulmonary oedema (see *Heart failure in adults*, page 294).

  In the event of worsening signs with vascular collapse, use a strong inotrope:
  dopamine IV at a constant rate by syringe pump (see final box):
  3 to 10 micrograms/kg/minute
  Once the haemodynamic situation allows (normal BP, reduction in the signs of peripheral circulatory failure), nitrates or morphine may be cautiously introduced.

  Digoxin should no longer be used for cardiogenic shock, except in the rare cases when a supraventricular tachycardia has been diagnosed by ECG. Correct hypoxia before using digoxin.
  digoxin slow IV
  Children: one injection of 0.010 mg/kg (10 micrograms/kg), to be repeated up to 4 times/24 hours if necessary
  Adults: one injection of 0.25 to 0.5 mg, then 0.25 mg 3 or 4 times/24 hours if necessary

- ***Cardiac tamponade*:** restricted cardiac filling as a result of haemopericardium or pericarditis.
  Requires immediate pericardial tap after restoration of blood volume +++

[1] The solvent of ceftriaxone for IM injection contains lidocaine. Ceftriaxone reconstituted using this solvent must NEVER be administered by IV route. For IV administration, water for injection must always be used.

- ***Tension pneumothorax***: drainage of the pneumothorax
- ***Symptomatic pulmonary embolism***: treat with an anticoagulant in a hospital setting

The administration of **dopamine** or **epinephrine** (**adrenaline**) at a constant rate requires that certain conditions be met:
– medical supervision in a hospital setting
– exclusive use of one vein (no other infusion or injection by this vein), avoid using the brachial site;
– use of an electric syringe pump
– progressive increase and adaptation of doses depending on clinical evolution
– intensive monitoring of drug administration, particularly during syringe changes

Example:
dopamine: 10 micrograms/kg/minute in a patient weighing 60 kg
Hourly dose: 10 (micrograms) x 60 (kg) x 60 (minutes) = 36 000 micrograms/hour = 36 mg/hour
In a 50 ml syringe, dilute one 200 mg-ampoule of dopamine with 0.9% sodium chloride to make a volume of 50 ml. Final solution contains 4 mg dopamine/ml.
For a dose of 36 ml/hour, administer the solution (4 mg/ml) at 9 ml/hour.

If there is no electric syringe pump, dilution in an infusion bag may be considered. However, it is important to consider the risks involved with this type of administration (accidental bolus or insufficient dose). The infusion must be constantly monitored to prevent any, even small, change from the prescribed rate of administration.

Example:
epinephrine: 0.2 microgram/kg/minute in a 60 kg patient
Rate: 0.2 (microgram) x 60 (kg) = 12 micrograms/minute
Dilute 2 ampoules of 1 mg (2 x 1000 micrograms) of epinephrine in 250 ml of 0.9% sodium chloride to make a solution of 8 micrograms/ml.
For a dose of 12 micrograms/minute, administer 1.5 ml/minute (12 ÷ 8 = 1.5)
Knowing that 1 ml = 20 drops, administer 20 (drops) x 1.5 ml/1 (minute) = 30 drops per minute.

Seizures

– Involuntary movements of cerebral origin (stiffness followed by clonic movements), accompanied by a loss of consciousness, and often urinary incontinence (generalized tonic-clonic seizures).
  It is important to distinguish seizures from 'pseudo-seizures' (e.g. in hysteria or tetany) during which consciousness may appear altered but is not lost.
– 2 priorities: stop the seizures and determine the cause. In pregnant women, eclamptic seizures require specific medical and obstetrical care (see page 25).

Initial treatment

During a seizure

– Protect from trauma, maintain airway, place patient in 'recovery position', loosen clothing.
– Most seizures are quickly self-limited. Immediate administration of an anticonvulsant is not systematic. If generalized seizure lasts more than 3 minutes, use diazepam to stop it:
  diazepam
  Children: 0.5 mg/kg preferably rectally[1] without exceeding 10 mg.
  IV administration is possible (0.3 mg/kg over 2 or 3 minutes), only if means of ventilation are available (Ambu bag and mask).
  Adults: 10 mg rectally or slowly IV.
  In all cases:
  • Dilute 10 mg (2 ml) of diazepam in 8 ml of 5% glucose or 0.9% sodium chloride.
  • If convulsion continues, repeat dose once after 5 minutes.
  • In infants and elderly patients, monitor respiration and blood pressure.
  • If convulsion continues after the second dose, treat as status epilepticus.

The patient is no longer seizing

– Look for the cause of the seizure and evaluate the risk of recurrence.
– Keep diazepam and 50% glucose available in case the patient starts seizing again.

Status epilepticus

Several distinct seizures without complete restoration of consciousness in between or an uninterrupted seizure lasting more than 10 minutes.
– Protect from trauma, loosen clothing.
– Maintain airway and administer oxygen as required.
– Insert an IV line.
– Administer **50% glucose** by slow IV: 1 ml/kg
– If diazepam (see above) has not stopped the seizure, continue with **phenobarbital** IV infusion in 5% glucose:
  Children: 15 mg/kg at a maximum rate of 30 mg/minute
  Adults: 10 to 15 mg/kg at a maximum rate of 100 mg/minute (maximum dose 1 g)
  Once the seizures have stopped, reduce the infusion rate.

[1] For rectal administration, use a syringe without a needle, or better, cut a nasogastric tube, CH8, to a length of 2-3 cm and attach it to the tip of the syringe.

There is a high risk of respiratory depression - even with abrupt onset -, especially in infants and elderly patients: monitor closely respiration with support ready at hand (Ambu bag via face mask or intubation).

Further treatment

– **Febrile seizures**
Determine the cause of the fever. Give **paracetamol** (see *Fever*, page 26), undress the patient, wrap in damp cloth.
In children under 3 years, there is usually no risk of later complications after simple febrile seizures and no treatment is required after the crisis. For further febrile episodes, give **paracetamol** PO.

– **Infectious causes**
Severe malaria (page 131), meningitis (page 165), meningo-encephalitis, cerebral toxoplasmosis (pages 217 and 218), cysticercosis (page 153), etc.

– **Metabolic causes**
Hypoglycaemia: **50% glucose**, 1 ml/kg by slow IV in all patients who do not regain consciousness, in the event of severe malaria and for newborns and malnourished children. If possible, check blood glucose level using a reagent strip test.

– **Iatrogenic causes**
Withdrawal of antiepileptic therapy in a patient being treated for epilepsy should be managed over a period of 4-6 months with progressive reduction of the doses. An abrupt stop of treatment may provoke severe recurrent seizures.

– **Epilepsy**
  - A first brief seizure does not need further protective treatment. Only patients with chronic repetitive seizures require further regular protective treatment with an antiepileptic drug, usually over several years.
  - Once a diagnosis is made, abstention from treatment may be recommended due to the risks associated with treatment. However, these risks must be balanced with the risks of aggravation of the epilepsy, ensuing seizure-induced cerebral damage and other injury if the patient is not treated.
  - It is always preferable to start with monotherapy. The effective dose must be reached progressively and symptoms and drug tolerance evaluated every 15 to 20 days.
  - An abrupt interruption of treatment may provoke status epilepticus. The rate of dose reduction varies according to the length of treatment; the longer the treatment period, the longer the reduction period (see *iatrogenic causes*, above). In the same way, a change from one antiepileptic drug to another must be made progressively with an overlap period of a few weeks.
  - First line treatments for generalised tonic-clonic seizures in children under 2 years are carbamazepine or phenobarbital, in older children and adults sodium valproate or carbamazepine. For information:

    carbamazepine PO
    Children: initial dose of 2 mg/kg/day in 1 or 2 divided doses; increase every week until the optimal dose for the individual has been reached (usually 10 to 20 mg/kg/day in 2 to 4 divided doses).
    Adults: initial dose of 200 mg/day in 1 or 2 divided doses; increase by 200 mg every week until the optimal dose for the individual has been reached (usually 800 to 1200 mg/day in 2 to 4 divided doses).

sodium valproate PO
Children over 20 kg: initial dose of 400 mg in 2 divided doses irrespective of weight; if necessary, increase the dose progressively until the optimal dose for the individual has been reached (usually 20 to 30 mg/kg/day in 2 divided doses).
Adults: initial dose of 600 mg/day in 2 divided doses; increase by 200 mg/day every 3 days until the optimal dose for the individual has been reached (usually 1 to 2 g/day in 2 divided doses).

phenobarbital PO
Children: initial dose of 3 to 4 mg/kg/day at night, increase the dose progressively to 8 mg/kg/day if necessary
Adults: initial dose of 2 mg/kg/day at night (without exceeding 100 mg per day), increase the dose progressively to 6 mg/kg/day if necessary

Special situation: seizures during pregnancy

– **Eclampsia**: seizures during the third trimester of pregnancy, most commonly in the context of pre-eclampsia (hypertension, oedema and proteinuria on reagent-strip test).

  • Symptomatic treatment of eclampsia:
  Treatment of choice is **magnesium sulfate** by IV infusion: 4 g diluted in 0.9% sodium chloride to be administered over 15 minutes. Then infuse 1 g/hour, continue magnesium sulfate for 24 hours following delivery or the last seizure. If seizure recurs, give another 2 g by slow IV injection (over 15 minutes).
  Monitor urine output. Stop the treatment if urinary output is less than 30 ml/hour or 100 ml/4 hours.
  ⚠ Before each injection, verify the concentration written on the ampoules: there is a risk of potentially fatal overdose. Always have calcium gluconate ready to reverse the effects of magnesium sulphate in the event of toxicity.
  Monitor patellar tendon reflex every 15 minutes during the infusion. If the patient has malaise, drowsiness, difficulty speaking or loss of patellar reflex: stop the magnesium sulfate and inject 1 g of **calcium gluconate** by slow, direct IV injection (over 5 to 10 minutes).
  Only in the absence of magnesium sulfate, use **diazepam**: 10 mg slow IV followed by 40 mg in 500 ml 5% glucose as a continuous infusion over 24 hours. If there is no venous access for the loading dose, give 20 mg rectally. In the event of treatment failure after 10 minutes, give a second dose of 10 mg.
  For direct IV or rectal administration dilute diazepam in 5% glucose or 0.9% sodium chloride to make a total volume of 10 ml.

  • Oxygen: 4 to 6 litres/minute

  • Nursing, hydration

  • Urgent delivery within 12 hours

  • Treatment of hypertension: see *Hypertension*, page 291

– **Other causes**: during pregnancy, consider that seizures may also be caused by cerebral malaria or meningitis (the incidence of these diseases is increased in pregnant women, see *Malaria*, page 131 and *Bacterial meningitis*, page 165).

Fever

Fever is defined as a temperature higher than 37.5°C axillary and 38°C if measured rectally. It is accepted that axillary temperature underestimates the core body temperature by 0.5°C, but this is very approximate. Use an electronic thermometer when available[1].
Fever is often linked, but not exclusively, with infection. All clinical examinations should include checking for fever.
In a febrile patient, first look for signs of serious illness, then try to establish a diagnosis.

Signs of serious illness

– Signs of sepsis with signs of shock: circulatory failure, respiratory distress, purpura, confusion, coma.
– Signs of a systemic illness: meningeal syndrome, seizures, heart murmur on auscultation, abdominal pain, rash, etc.
– Patient's underlying condition: malnutrition, immune suppression, splenectomy, chronic disease, the very young and the very old, bedridden patients.

Aetiology

Many different diseases, infectious or noninfectious, acute or chronic, benign or malignant, may be accompanied by fever. Among the infectious diseases requiring immediate treatment, look for:
– purpura fulminans
– bacterial meningitis
– severe malaria
– severe bacterial skin infections
– acute pyelonephritis with urinary retention
– peritonitis or gastrointestinal infection
– pneumonia with signs of respiratory distress
– subglottic or epiglottic laryngitis
– endocarditis
– septicaemia

In the absence of signs of serious illness and obvious diagnosis, patients may return home with an antipyretic and should be educated to prevent dehydration (plenty of fluids) and to recognize symptoms that need medical attention. Patients should return for a new consultation if there is no improvement within 48 hours of the initial consultation or before if their condition deteriorates.

In case of doubt (e.g. about the evolution, the quality of surveillance) and depending on the context (geographical distance, problems of transport), it may be better to keep patients 12 to 24 hours for observation.

Complications

– Convulsions
– Dehydration
– Confusion, delirium
– Schock

It is important, particularly in children, to look for signs of these complications, to treat them, and most importantly to prevent them.

---

1 Temperature should be measured over a period of 5 minutes when using a mercury thermometer.

Symptomatic treatment

– Undress the patient; wrap the child in a damp cloth or bathe for a few minutes in water at 37°C.

– Antipyretics:

paracetamol PO
Children: 60 mg/kg/day in 3 or 4 divided doses
Adults: 3 to 4 g/day in 3 or 4 divided doses

or
acetylsalicylic acid (**A.A.S**) PO (to be avoided in children under 16 years)
Adult: 1 to 3 g/day in 3 or 4 divided doses

or
ibuprofen PO
Children over 3 months: 30 mg/kg/day in 3 divided doses
Adults: 1200 to 1800 mg/day in 3 to 4 divided doses

Age	2 months	1 year	5 years	15 years	adult
Weight	4 kg	8 kg	15 kg	35 kg	
Paracetamol					
120 mg/5 ml oral solution	2 ml x 3	3 to 6 ml x 3	–	–	–
100 mg tablet	1/2 tab x 3	3/4 to 1 1/2 tab x 3	1 1/2 to 3 tab x 3	–	–
500 mg tablet			1/4 to 1/2 tab x 3	1/2 to 1 1/2 tab x 3	2 tab x 3
A.A.S.	Avoid				
300 mg tablet					2 tab x 3
500 mg tablet					1 tab x 3

Age	3 months	6 years	15 years	adult
Weight	5 kg	20 kg	35 kg	
Ibuprofen				
100 mg/5 ml oral solution	Do not administer	Use the graduated pipette (in kg): one pipette filled up to the graduation corresponding to the child's weight x 3	–	–
200 mg tablet		–	1 to 2 tab x 3	2 tab x 3
400 mg tablet		–	–	1 tab x 3

– Properly hydrate the patient.
– Continue to feed, even if a child has little appetite. The mother must be persuaded of the importance of feeding/breastfeeding.
– In the event of a febrile seizure: see page 24.
– Treatment of the cause: according to the aetiology of the fever.

Notes:
– Paracetamol is the drug of choice for pregnant and breast-feeding women.
– Acetylsalicylic acid is not recommended during the first 5 months of pregnancy, contra-indicated from the beginning of the 6th month, and to be avoided in breastfeeding-women.
– Ibuprofen is not recommended during the first 5 months of pregnancy and contra-indicated from the beginning of the 6th month. It can be administered to breast-feeding women as short-term treatment.

Pain

Pain results from a variety of pathological processes. It is expressed differently by each patient depending on cultural background, age, etc. It is a highly subjective experience meaning that only the individual is able to assess his/her level of pain. Regular assessment of the intensity of pain is indispensable in establishing effective treatment.

Clinical features

– **Pain assessment**

- Intensity: use a simple verbal scale in children over 5 years and adults, and NFCS or FLACC scales in children less than 5 years (see pain rating scales on following page).
- Pattern: sudden, intermittent, chronic; at rest, at night, on movement, during care procedures, etc.
- Character: burning, cramping, spasmodic, radiating, etc.
- Aggravating or relieving factors, etc.

– **Clinical examination**

- Of the organ or area where the pain is located.
- Specific signs of underlying disease (e.g. bone or osteoarticular pain may be caused by a vitamin C deficiency) and review of all systems.
- Associated signs (fever, weight loss, etc.)

– **Synthesis**

The synthesis of information gathered during history taking and clinical examination allows aetiological diagnosis and orients treatment. It is important to distinguish:

- *Nociceptive* pain: it presents most often as acute pain and the cause-effect relationship is usually obvious (e.g. acute post-operative pain, burns, trauma, renal colic, etc.). The pain may be present in different forms, but neurological exam is normal. Treatment is relatively well standardized.
- *Neuropathic* pain, due to a nerve lesion (section, stretching, ischaemia): most often chronic pain. On a background of constant, more or less localized pain, such as paraesthesia or burning, there are recurrent acute attacks such as electric shock-like pain, frequently associated with disordered sensation (anaesthesia, hypo or hyperaesthesia). This type of pain is linked to viral infections directly affecting the CNS (herpes simplex, herpes zoster), neural compression by tumors, post-amputation pain, paraplegia, etc.
- *Mixed* pain (cancer, HIV) for which management requires a broader approach.

Pain evaluation scales

Self-evaluation scale - Children over 5 years and adults

Simple verbal scale (SVS)

Intensity of pain	No pain	Mild pain	Moderate pain	Severe pain
Scoring	**0**	**1**	**2**	**3**
Write down	**0**	**+**	**++**	**+++**

Observational evaluation scale - Children 2 months-5 years

FLACC scale (Face Limb Activity Cry Consolability)

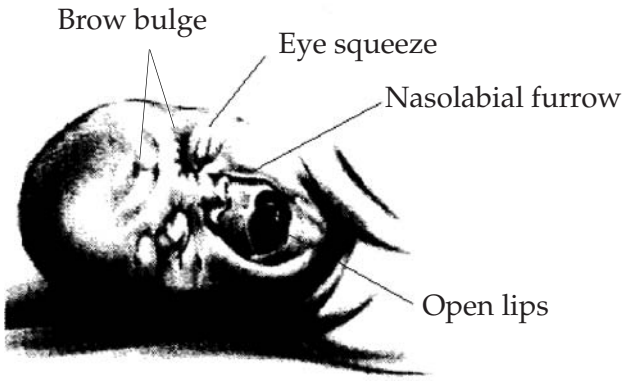
Items	Scoring		
	0	**1**	**2**
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant frown, clenched jaw, quivering chin
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort

Each category is scored from 0 to 2, giving a final score between 0 and 10.
0 to 3: mild pain, **4 to 7**: moderate pain, **7 to 10**: severe pain

Observational evaluation scale - Children under 2 months

NFCS scale (Neonatal Facial Coding System)

Items	Scoring	
	0	**1**
Brow bulge	no	yes
Eye squeeze	no	yes
Nasolabial furrow	no	yes
Open lips	no	yes



A score of 2 or more signifies significant pain, requiring analgesic treatment.

Treatment

Treatment depends on the type and intensity of the pain. It may be both aetiological and symptomatic if a treatable cause is identified. Treatment is symptomatic only in other cases (no cause found, non-curable disease).

Nociceptive pain

The WHO classifies analgesics used for this type of pain on a three-step ladder:

- **Step 1**: non-opioid analgesics such as paracetamol and nonsteroidal anti-inflammatory drugs (NSAIDs).
- **Step 2**: weak opioid analgesics such as codeine and tramadol. Their combination with one or two Step 1 analgesics is recommended.
- **Step 3**: strong opioid analgesics, first and foremost morphine. Their combination with one or two Step 1 analgesics is recommended.

The treatment of pain is based on a few fundamental concepts:

- Pain can only be treated correctly if it is correctly evaluated. The only person who can evaluate the intensity of pain is the patient himself. The use of pain assessment scales is invaluable.
- The pain evaluation observations should be recorded in the patient chart in the same fashion as other vital signs.
- Treatment of pain should be as prompt as possible.
- It is recommended to administer analgesics in advance when appropriate (e.g. before painful care procedures).
- Analgesics should be prescribed and administered at fixed time intervals (not on demand).
- Oral forms should be used whenever possible.
- The combination of different analgesic drugs (multimodal analgesia) is advantageous.
- Start with an analgesic from the level presumed most effective: e.g., in the event of a fractured femur, start with a Step 3 analgesic.
- The treatment and dose chosen are guided by the assessment of pain intensity, but also by the patient's response which may vary significantly from one person to another.

Treatment of acute pain

Mild pain	Paracetamol + /- NSAID
Moderate pain	Paracetamol + /- NSAID + tramadol or codeine
Severe pain	Paracetamol + /- NSAID + morphine

	Analgesics	Children	**Adults** (except pregnant/ breast-feeding women)	Remarks
Level 1	paracetamol PO	15 mg/kg every 6 hours or 10 mg/kg every 4 hours	500 mg to 1 g every 4 to 6 hours (max. 4 g/day)	The efficacy of IV paracetamol is not superior to the efficacy of oral paracetamol; the IV route is restricted to situations where oral administration is impossible.
	paracetamol IV	< 10 kg: 7.5 mg/kg every 6 hours (max. 30 mg/kg/day) > 10 kg: 15 mg/kg every 6 hours (max. 60 mg/kg/day)	≤ 50 kg: 15 mg/kg every 6 hours (max. 60 mg/kg/day) > 50 kg: 1 g every 6 hours (max. 4 g/day)	
	acetylsalicylic acid (aspirin) PO	–	300 mg to 1 g every 4 to 6 hours (max. 3 to 4 g/day)	Avoid in children less than 16 years.
	diclofenac IM	–	75 mg once daily	Treatment must be as short as possible. Respect contra-indications.
	ibuprofen PO	> 3 months: 30 mg/kg/day in 3 divided doses	1200 to 1800 mg/day in 3 to 4 divided doses	
Level 2	codeine PO	6 months-12years: 0.5 to 1 mg/kg every 4 to 6 hours > 12 years: 30 to 60 mg every 4 to 6 hours (max. 240 mg/day)	30 to 60 mg every 4 to 6 hours (max. 240 mg/day)	Add a laxative if treatment > 48 hours.
	tramadol PO	> 6 months: 2 mg/kg every 6 hours	50 to 100 mg every 4 to 6 hours (max. 400 mg/day)	25 to 50 mg every 12 hours in elderly patients and in patients with severe renal or hepatic impairment.
	tramadol SC, IM, slow IV or infusion	> 6 months: 2 mg/kg every 6 hours	50 to 100 mg every 4 to 6 hours (max. 600 mg/day)	

	Analgesics	Children	**Adults** (except pregnant/ breast-feeding women)	Remarks
Level 3	morphine PO, immediate release (MIR)	> 6 months: 1 mg/kg/day in 6 divided doses at 4 hour-intervals, to be ajusted in relation to pain intensity	60 mg/day in 6 divideded doses at 4 hour-intervals, to be ajusted in relation to pain intensity	- Reduce the dose (30 mg/day) in elderly patients and patients with renal or hepatic impairment. - Add a laxative if treatment > 48 hours.
	morphine PO, slow release (MSR)	The effective daily dose is determined during the initial treatment with immediate release morphine (MIR). If treatment is initiated directly with MSR: > 6 months: 1 mg/kg/day in 2 divided doses at 12 hour-intervals, to be ajusted in relation to pain intensity	The effective daily dose is determined during the initial treatment with immediate release morphine (MIR). If treatment is initiated directly with MSR: 60 mg/day in 2 divided doses at 12 hour-intervals, to be ajusted in relation to pain intensity	- Do not initiate treatment with the sustained release morphine in elderly patients or those with renal or hepatic impairment. Begin treatment with the immediate release morphine (MIR). - Add a laxative if treatment > 48 hours.
	morphine SC, IM	> 6 months: 0.1 to 0.2 mg/kg every 4 hours	0.1 to 0.2 mg/kg every 4 hours	- In elderly patients and in patients with severe renal or hepatic impairment: reduce doses by half and administer less frequently, according to clinical response. - Add a laxative if treatment > 48 hours.
	morphine IV	> 6 months: 0.1 mg/kg administered in fractionated doses (0.05 mg/kg every 10 minutes), to be repeated every 4 hours if necessary	0.1 mg/kg administered in fractionated doses (0.05 mg/kg every 10 minutes), to be repeated every 4 hours if necessary	

Notes on the use of morphine and derivatives:

– Morphine is an effective treatment for many types of severe pain. Its analgesic effect is dose-dependent. Its adverse effects have often been exaggerated and should not be an obstacle to its use.

– The most serious adverse effect of morphine is respiratory depression, which may be fatal. This adverse effect results from overdose. It is, therefore, important to increase doses gradually. Respiratory depression is preceded by drowsiness, which is a warning to monitor respiratory rate (RR).
The RR should remain equal to or greater than the thresholds indicated below:

Neonate	RR ≥ 35 respirations/min
Child 1 to 12 months	RR ≥ 25 respirations/min
Child 1 to 2 years	RR ≥ 20 respirations/min
Child 2 to 5 years	RR ≥ 15 respirations/min
Child > 5 years and adult	RR ≥ 10 respirations/min

Respiratory depression must be identified and treated quickly: verbal and physical stimulation of the patient; administration of oxygen; respiratory support (bag and mask) if necessary. If no improvement, administer naloxone (antagonist of morphine) in bolus of 1 to 3 micrograms/kg as necessary until RR normalises and the excessive drowsiness resolves.

– Morphine and codeine always cause constipation. A laxative should be prescribed if the opioid treatment continues more than 48 hours. **Lactulose** PO is the drug of choice: children < 1 year: 5 ml/day; children 1-6 years: 5 to 10 ml/day; children 7-14 years: 10 to 15 ml/day; adults: 15 to 45 ml/day).
If the patient's stools are soft, a stimulant laxative (**bisacodyl** PO: children > 3 years: 5 to 10 mg/day; adults: 10 to 15 mg/day) is preferred.

– Nausea and vomiting are common at the beginning of treatment.
In adults, **haloperidol** PO (2 mg/ml oral solution): 1 to 2 mg to be repeated up to 6 times daily.
Metoclopramide PO may also be used (children: 5 to 15 mg/day in 3 divided doses, adults: 15 to 30 mg/day in 3 divided doses). Do not combine haloperidol and metoclopramide.

– For chronic pain in late stage disease (cancer, AIDS etc.), morphine PO is the drug of choice. It may be necessary to increase doses over time according to pain assessment. Do not hesitate to give sufficient and effective doses.

– Morphine, tramadol and codeine have similar modes of action and should not be combined.

– Buprenorphine, nalbuphine and pentazocine must not be combined with morphine, pethidine, tramadol or codeine because they have competitive action.

Treatment of nociceptive pain in pregnant and breast-feeding women

Analgesics		Pregnancy		Breast-feeding
		1st and 2nd trimester	3rd trimester and term	
Level 1	**paracetamol**	1st choice	1st choice	1st choice
	aspirin	avoid	contra-indicated	avoid
	ibuprofen	avoid	contra-indicated	possible
Level 2	**codeine**	possible	The newborn infant may develop withdrawal symptoms, respiratory depression and drowsiness in the event of prolonged administration of large doses at the end of the 3rd trimester. Closely monitor the newborn infant.	Use with caution, for a short period (2-3 days), at the lowest effective dose. Monitor the mother and the child: in the event of excessive drowsiness, stop treatment.
	tramadol	possible	The child may develop drowsiness when the mother receives tramadol at the end of the 3rd trimester and during breast-feeding. Administer with caution, for a short period, at the lowest effective dose, and monitor the child.	
Level 3	**morphine**	possible	The child may develop withdrawal symptoms, respiratory depression and drowsiness when the mother receives morphine at the end of the 3rd trimester and during breast-feeding. Administer with caution, for a short period, at the lowest effective dose, and monitor the child.	

Neuropathic pain

Commonly used analgesics are often ineffective in treating this type of pain.

Treatment of neuropathic pain is based on a combination of two centrally acting drugs:

amitriptyline PO
Adults: start with a dose of 10 to 25 mg/day at night and increase progressively to reach an effective dose, without exceeding 150 mg/day. Reduce the dose by 1/2 in elderly patients.

carbamazepine PO
Adults: start with a dose of 200 mg once daily at night for one week, then 400 mg/day in 2 divided doses (morning and night) for one week, then 600 mg/day in 3 divided doses. Given its teratogenic risk, carbamazepine should only be used in women of childbearing age when covered by non-hormonal contraception (copper intrauterine device).

Mixed pain

In mixed pain with a significant component of nociceptive pain, such as in cancer or AIDS, morphine is combined with antidepressants and antiepileptics.

Chronic pain

In contrast to acute pain, medical treatment alone is not always sufficient in controlling chronic pain. A multidisciplinary approach including medical treatment, physiotherapy, psychotherapy and nursing is often necessary to allow good pain relief and encourage patient self-management.

Co-analgesics

The combination of certain drugs may be useful or even essential in the treatment of pain: antispasmodics, muscle relaxants, anxiolytics, corticosteroids, local anaesthesia, etc.

Anaemia

– Anaemia is defined as a haemoglobin level below reference values[1]. It is a frequent symptom in tropical settings where 10 to 20 % of the population present with Hb levels less than 10 g/dl.

– Anaemia is caused by:
  • *decreased production of red blood cells*: nutritional iron and/or folic acid deficiency, depressed bone marrow function, some infections (HIV, visceral leishmaniasis etc.);
  • *loss of red blood cells*: acute or chronic haemorrhage (ancylostomiasis etc.)
  • *increased destruction of red blood cells (haemolysis)*: malaria; infections or the intolerance of certain drugs by patients with G6PD deficiency (primaquine, dapsone, cotrimoxazole, nalidixic acid, nitrofuran derivatives etc.); haemoglobinopathies (sickle cell disease, thalassaemias); certain bacterial and viral infections (HIV).

– In tropical settings, the causes are often interlinked, the two most common causes are nutritional deficiencies and malaria. The groups most at risk are children and young women, particularly during pregnancy.

– Anaemia in itself is not an indication for transfusion. Most anaemias are well tolerated and can be corrected with simple aetiological treatment.

Clinical features

– Common signs of anaemia: pallor of the conjunctivae, mucous membranes, palms of hands and soles of feet; fatigue, dizziness, oedema in the lower limbs, dyspnoea, tachycardia, heart murmur.

– Signs that anaemia may be immediately life threatening: sweating, thirst, cold extremities, tachycardia, respiratory distress and shock.

– Look for signs of a specific pathology: cheilosis, nutritional deficiency glossitis, haemolytic jaundice, signs of malaria (see page 131) etc.

Laboratory

– Haemoglobin level (or if haemoglobin is not available, haematocrit)

– Thick and thin blood films or rapid test if malaria is suspected

---

1 Normal values : > 13 g/dl in men; > 12 g/dl in women ; > 11 g/dl in pregnant women; > 13.5 g/dl in newborns; > 9.5 g/dl in infants from 2 to 6 months; > 11 g/dl in children from 6 months to 6 years; > 11.5 g/dl in children from 6 to 12 years.

Treatment

Iron deficiency anaemia

– **elemental iron** PO[2] for a minimum of 2 months
Children under 2 years: 30 mg/day in 2 divided doses = 1/2 tab/day
Children from 2 to 12 years: 120 mg/day in 2 divided doses = 2 tab/day
Adults: 120 to 180 mg/day in 2 or 3 divided doses = 2 to 3 tab/day

or preferably, give a combination of **elemental iron** (65 mg) + **folic acid** (0.40 mg) PO[2].

– Combine with an anthelminthic
albendazole PO (except during the 1st trimester of pregnancy)
Children from 1 to 2 years: 200 mg as a single dose
Children over 2 years and adults: 400 mg as a single dose
or
mebendazole PO (except during the 1st trimester of pregnancy)
Children over 1 year and adults: 500 mg as a single dose

Folic acid deficiency anaemia (rarely isolated)

– **folic acid** PO
Children under 1 year: 0.5 mg/kg once daily for 4 months
Children over 1 year and adults: 5 mg once daily for 4 months

Haemolytic anaemia

– Malaria: iron is ineffective except in patients with an associated iron deficiency. For the treatment of malaria, see page 131.

– G6PD deficiency: no specific treatment; early treatment of infections; stop any drugs suspected to be causing a reaction.

Immediately life threatening anaemia

– Oxygen, particularly for children.

– Transfusion after determination of blood group and type and screening for HIV, hepatitis B and C, syphilis, malaria in endemic areas. To determine the blood volume required and the rate of transfusion, see next page.

Note: the prevalence of HIV infection makes screening of donors vital. If there is no possibility of screening, it is up to the physician to weigh the transfusion risk with the life or death risk of not transfusing the patient. All transfusions that are not strictly indicated are strictly contra-indicated.

---

2 Doses are calculated in elemental iron.
Tablets of 200 mg ferrous sulphate such as those of ferrous sulphate + folic acid contain 65 mg of elemental iron.
300 mg tablets of ferrous gluconate contain 35 mg of elemental iron.

Adults	
Determine the *volume* of whole blood to be transfused: V = (haemoglobin required **minus** patient's haemoglobin) **multiplied** by 6 **multiplied** by patient's weight	Example: haemoglobin required = 7 g/dl patient's haemoglobin = 4 g/dl patient's weight = 60 kg Volume in ml = (7 – 4) x 6 x 60 = 1080 ml
Determine the *transfusion rate*: (1 ml of whole blood = 15 to 20 drops)	Example: 1080 ml to be administered over 3 hours 1080 (ml) ÷ 180 (minutes) = 6 ml/minute 6 (ml) x 15 (drops) = 90 drops/minute
Children	
Newborns and children under 1 year: 15 ml/kg over 3 to 4 hours Children over 1 year: 20 ml/kg over 3 to 4 hours Malnourished children: 10 ml/kg over 3 hours	Example: a malnourished child weighing 25 kg 10 (ml) x 25 (kg) = 250 ml over 3 hours 250 (ml) ÷ 180 (minutes) = 1.4 ml/minute 1.4 (ml) x 15 (drops) = 21 drops/minute

Monitor vital signs (pulse, blood pressure, respiratory rate, temperature) and watch for clinical signs of transfusion reactions.

In some cases, particularly in children suffering from severe malaria, anaemia may cause heart failure which may be decompensated by transfusion. If signs of hypervolaemia are seen: **furosemide** slow, direct IV: 1 mg/kg without exceeding 20 mg/kg.

– If present, treat any pulmonary or parasitic infection (malaria).

Prevention

– Iron or folic acid deficiency:
  • drug supplements : **elemental iron** (65 mg) + **folic acid** (0.40 mg) PO
    Pregnant woman: 60 to 120 mg once daily or in 2 divided doses = 1 to 2 tab/day
  • Nutritional supplements if the basic diet is insufficient
– For patients with sickle cell disease: long term treatment with **folic acid** PO: 5 mg/day.
– Early treatment of malaria, helminthic infections etc.

Severe acute malnutrition

Severe acute malnutrition is caused by a significant imbalance between nutritional intake and individual needs. It is most often caused by both quantitative (number of kilocalories/day) and qualitative (vitamins and minerals, etc.) deficiencies.

Children over 6 months of age

The two principal forms of severe malnutrition are:

– *Marasmus*: significant loss of muscle mass and subcutaneous fat, resulting in a skeletal appearance.

– *Kwashiorkor*: bilateral oedema of the lower limbs/oedema of the face, often associated with cutaneous signs (shiny or cracked skin, burn-like appearance; discoloured and brittle hair).

The two forms may be associated (marasmic-kwashiorkor).

In addition to these characteristic signs, severe acute malnutrition is accompanied by significant physiopathological disorders (metabolic disturbances, anaemia, compromised immunity, leading to susceptibility to infections often difficult to diagnose, etc.).
Complications are frequent and potentially life-threatening.
Mortality rates may be elevated in the absence of specific medical management.

Admission and discharge criteria for treatment programmes for severe acute malnutrition are both anthropometric and clinical:

- Mid-upper arm circumference (MUAC) is the circumference, measured in mid-position, of the relaxed left upper arm, taken in children of 6 to 59 months (65 to 110 cm in height). MUAC measures the degree of muscle wasting. A MUAC of < 110 mm indicates severe malnutrition and significant mortality risk.
- Weight for height (W/H) index assesses the degree of weight loss by comparing the weight of the malnourished child with non-malnourished children of the same height. Severe malnutrition is defined as a W/H index of < – 3Z with reference to the new WHO child growth standards[1].

[1] Some national programmes define anthropometric admission and discharge criteria with reference to NCHS growth standards, with thresholds expressed in percentage of the median.

- The presence of bilateral oedema of the lower limbs (when other causes of oedema have been ruled out) indicates severe malnutrition, regardless of the MUAC and W/H.

Usual admission criteria are: MUAC < 110 mm (MUAC is not used as an admission criterion in children older than 59 months or taller than 110 cm) or W/H < – 3Z[2] or presence of bilateral oedema of the lower limbs.
Usual discharge (cure) criteria are: W/H > – 2Z[2] and absence of bilateral oedema (2 consecutive assessments, one week apart) and absence of acute medical problems. MUAC is not used as a discharge criterion.

Medical management (hospitalisation or ambulatory care) is based on the presence or absence of associated serious complications:

- Children exhibiting anorexia, or significant medical complications, such as severe anaemia, severe dehydration or severe infection (complicated acute malnutrition) should be hospitalised[3].
- Children without significant medical complications (uncomplicated acute malnutrition) may undergo treatment on an ambulatory basis, with weekly medical follow-up.

Treatment

1) **Nutritional treatment**

Nutritional treatment is based on the use of therapeutic foods enriched with vitamins and minerals:

– Therapeutic milks (for use exclusively in hospitalised patients):
  - F-75 therapeutic milk, low in protein, sodium and calories (0.9 g of protein and 75 kcal per 100 ml) is used in the initial phase of treatment for patients suffering from complicated acute malnutrition. It is used to cover basic needs while complications are being treated. It is given in 8 daily meals.
  - F-100 therapeutic milk, in which the concentration of protein and calories is higher (2.9 g of protein and 100 kcal per 100 ml), replaces F-75 after several days, once the patient is stabilised (return of appetite, clinical

[2] Some national programmes define anthropometric admission and discharge criteria with reference to NCHS growth standards, with thresholds expressed in percentage of the median.

[3] As a rule, any malnourished child presenting with medical complications should initially be hospitalised, even if s/he suffers from moderate, rather than severe, malnutrition (W/H > – 3Z).

improvement; disappearance or reduction of oedema). The objective is to facilitate rapid weight gain. It can be given with, or be replaced by, RUTF.

– RUTF (ready-to-use therapeutic food), i.e. foods which are ready for consumption (for example, peanut paste enriched with milk solids, such as Plumpy'nut®), are used in children treated in both hospital or ambulatory settings. The nutritional composition of RUTF is similar to F-100, but the iron content is higher. It is designed to promote rapid weight gain (approximately 500 kcal per 100 g). RUTF are the only therapeutic foods which can be used in ambulatory treatment.

Furthermore, it is important to give drinking water, in addition to meals, especially if the ambient temperature is high or the child has a fever.

Breastfeeding should continue in children of the appropriate age.

2) **Routine medical treatment**

In the absence of specific medical complications, the following routine treatments should be implemented in both ambulatory and hospital settings:

– *Infections*
  - Measles vaccination on admission
  - Broad spectrum antibiotic therapy starting on Day 1 (**amoxicillin** PO: 70-100 mg/kg/day in 2 divided doses for 5 days) [4].
  - In endemic malaria areas: rapid test on D1, with treatment in accordance with results. If testing is not available, give malaria treatment (page 131).
  - Treatment for intestinal worms on D1 or D8

    albendazole PO

    Children > 6 months and adults: 400 mg as a single dose (200 mg in children > 6 months but < 10 kg)

– *Micronutrient deficiencies*

  The use of therapeutic foods corrects most of these deficiencies. However, some supplements are still necessary:

[4] If specific signs of infection are present, the choice of treatment should be directed by the suspected focus.

- vitamin A is given routinely on admission, **retinol** (vitamin A)[5]:
  Children from 6 months to 1 year: 100,000 IU as a single dose
  Children over 1 year: 200,000 IU as a single dose
- **folic acid** PO 5 mg is given routinely on admission

3) **Management of common complications**

– *Diarrhoea and dehydration*

Diarrhoea is often associated with malnutrition. Therapeutic foods facilitate the recovery of gastrointestinal mucosa and restore the production of gastric acid, digestive enzymes and bile. Amoxicillin, administered as part of routine treatment, is effective in reducing bacterial load. Diarrhoea generally resolves without any additional treatment. Watery diarrhoea is sometimes related to another pathology (otitis, pneumonia, malaria, etc.), which should be considered.

Plain water, not oral rehydration solution, is given to children with diarrhoea after each watery stool. Oral rehydration solution is reserved only for cases of established dehydration.

If an aetiological treatment is necessary, see page 83.

Dehydration is more difficult to assess in malnourished than healthy children (e.g., delay in return of skin pinch and sunken eyes are present even without dehydration in children with marasmus.)

The diagnosis is made on the basis of a history of watery diarrhoea of recent onset accompanied by weight loss, corresponding to fluid losses since the onset of diarrhoea. Chronic and persistent diarrhoea does not require rapid rehydration.

The rehydration protocol differs from that used in non-malnourished:

- In the absence of hypovolaemic shock, rehydration is conducted by the oral route (if necessary by nasogastric tube), using specific oral rehydration solutions[6] (**ReSoMal**), containing less sodium and more potassium than standard solutions.
  ReSoMal is administered under strict medical supervision (clinical evaluation and weight every hour). The dose is 10 ml/kg/hour for the first 2 hours, then 5 ml/kg/hour until the weight loss (known or estimated) has been corrected.

5 Complete curative treatment with vitamin A is reserved for patients presenting with clinically detectable ocular lesions (see *Vitamin A deficiency*, page 121).

6 Except for cholera, in which case standard oral rehydration solutions are used.

In practice, it is useful to determine the target weight before starting rehydration. The target weight is the weight before the onset of diarrhoea. If the child is improving and showing no signs of fluid overload, rehydration is continued until the previous weight is attained.
If the weight loss cannot be measured (e.g. in newly admitted child), it can be estimated at 2-5% of the child's current weight. The target weight should not exceed 5% of the current weight (e.g., if the child weighs 5 kg before starting rehydration, the target weight should not exceed 5.250 kg). Regardless of the target weight, rehydration should be stopped if signs of fluid overload appear.

- The IV route carries a significant risk of fluid overload and cardiac failure. It is used only in cases of hypovolaemic shock (weak or absent radial pulse, cold extremities, altered level of consciousness, associated with recent weight loss, if known):
  Ringer lactate: 15 to 20 ml/kg over 30 minutes to 1 hour, under strict medical supervision. Every 15 minutes, evaluate clinical response, and check for signs of over-hydration.
  - If the clinical condition has improved after 30 minutes (recovery of consciousness, strong pulse, return to previous weight, if known), continue the infusion at the rate of 15 to 20 ml/kg for one hour, then switch to the oral route with **ReSoMal**: 10 ml/kg/hour for 2 hours.
  - If there is no improvement, or worsening (signs of fluid overload) in clinical condition after the first hour of IV therapy, reduce the infusion rate to keep the vein open, and treat for septicaemia.

– *Bacterial infections*

Lower respiratory infections, otitis, skin and urinary infections are common, but sometimes difficult to identify (absence of fever and specific symptoms). Infection should be suspected in a drowsy or apathetic child.
Presence of hypothermia or hypoglycaemia is suspicious for severe infection. Since the focus may be difficult to determine, a broad spectrum antibiotic regime using 2 antibiotics is recommended.

– *Hypothermia and hypoglycaemia*

Hypothermia (rectal temperature < 35.5°C or axillary < 35°C) is a frequent cause of death in the first days of hospitalisation.
Prevention measures include keeping the child close to the mother's body (kangaroo method) and provision of blankets. In case of hypothermia, warm the child as above, monitor the temperature, treat hypoglycaemia and underlying infection.

In hypoglycaemia, suspected or confirmed (test strip), administer glucose PO if the child is conscious (50 ml of sugar water [50 ml water + a teaspoon of sugar] or 50 ml of milk); if the child is unconscious, 1 ml/kg of 50% glucose IV. Treat underlying infection.

– *Oral candidiasis*

  Should be systematically sought as it interferes with feeding, see treatment page 92.

– *Cutaneous lesions of kwashiorkor*
  - Dry areas: **zinc oxide ointment** twice daily
  - Widespread exudative lesions: **gentian violet** twice daily (avoid on the face)
  - If secondarily infected: treat as impetigo (page 105).

If the child fails to recover despite appropriate nutritional and medical treatment, consider another pathology: tuberculosis, HIV infection, etc.

Adolescents and adults

Clinical examination of the patient (sudden weight loss, loss of mobility from muscle wasting, cachexia, bilateral lower limb oedema in the absence of other causes of oedema) is indispensable for the diagnosis and adapted medical, nutritional and even social care of the patient.

Admission and discharge criteria, as a rough guide, are:

– Admission criteria:
  Adolescents: same as in children (but MUAC is not used).
  Adults: MUAC < 160 mm or bilateral lower limb oedema (Grade 3 or more, having excluded other causes of oedema) or MUAC < 185 mm in poor general condition (for example, inability to stand, evident dehydration).
  As in children, any malnourished patient presenting with significant complications should initially be hospitalised, regardless of the anthropometric criteria above.

– Discharge criteria:
  Adolescents: as in children.
  Adults: weight gain of 10-15% over admission weight and oedema below Grade 2 and good general condition.

Nutritional treatment follows the same principles as in children, but the calorie intake in relation to body weight is lower.

Routine treatment is similar to that in children, with the following exceptions:

- Measles vaccine is only administered to adolescents (up to age 15).
- Antibiotics are not routinely given, but infections should be considered, and treated or excluded, in the assessment of the patient.

For more information on the management of malnutrition in infants, children and adults, refer to the MSF handbook *Nutrition*.

CHAPTER 2

Respiratory diseases

Rhinitis and rhinopharyngitis (common cold)	49
Acute sinusitis	50
Acute laryngitis	51
Acute pharyngitis	53
Diphtheria	55
Otitis	57
Whooping cough (pertussis)	60
Bronchitis	62
Bronchiolitis	64
Acute pneumonia	66
Staphylococcal pneumonia	72
Asthma	73
Pulmonary tuberculosis	78

Rhinitis and rhinopharyngitis (common cold)

Rhinitis (inflammation of the nasal mucosa) and rhinopharyngitis (inflammation of the nasal and pharyngeal mucosa) are generally benign, self-limited and most often of viral origin. However, they may be an early sign of another infection (e.g. measles or influenza) or may be complicated by a bacterial infection (e.g. otitis media or sinusitis).

Clinical features

– Nasal discharge or obstruction, which may be accompanied by sore throat, fever, cough, lacrimation, and diarrhoea in infants. Purulent nasal discharge is not indicative of a secondary bacterial infection.
– In children under 5 years, routinely check the tympanic membranes to look for an associated otitis media.

Treatment

– Antibiotic treatment is not recommended: it does not promote recovery nor prevent complications.
– Treatment is symptomatic:
  • Clear the nose with 0.9% sodium chloride[1].
  • Fever, throat soreness: paracetamol PO for 2 to 3 days (see page 26).

[1] For a child: place him on his back, head turned to the side, and instil 0.9% sodium chloride into each nostril.

Acute sinusitis

Acute sinusitis is an infection of the sinus mucosa with purulent discharge of nasal (rhinitis, allergies, obstruction) or dental origin. It may develop into chronic sinusitis, particularly in older children and adults.

Clinical features

– Facial pain or ache and purulent nasal discharge

Older children and adults

– Peri-orbital pain in frontal sinusitis; facial pain in maxillary and/or ethmoidal sinusitis.
– Purulent nasal discharge from the side with pain, nasal obstruction and moderate fever.
– On examination
  • pain on pressure over the forehead, under the upper border of the orbit or cheek,
  • purulent secretions in the meatus and inflammation of the mucosa.

The most common causes are *Haemophilus influenzae* in children under 5 years and pneumococci in patients over 5 years.

Type specific to infants and small children

– Acute ethmoiditis: high fever, inflammation and swelling of the lower eyelids and the bridge of the nose, purulent nasal discharge.
– Risk of infection spreading to the neighbouring bony structures, orbits and the meninges.

The most common causes are *Haemophilus influenzae*, pneumococci and staphylococci.

Treatment

– Nasal irrigation with 0.9% sodium chloride or Ringer Lactate 4 to 6 times/day to clear the airway.

– Pain and fever: give paracetamol PO (see page 26).

– Antibiotic treatment, depending on the severity of infection:
amoxicillin PO: 80 mg/kg/day in 2 or 3 divided doses for 7 to 10 days
For patients allergic to penicillin:
erythromycin PO: 30 to 50 mg/kg/day in 2 to 3 divided doses for 7 to 10 days

– For sinusitis secondary to dental infection: dental extraction while under antibiotic treatment.

– In infants with ethmoiditis, strong antibiotic treatment is necessary:
ceftriaxone IM: 100 mg/kg/day in 2 injections for 10 days
or, failing that,
ampicillin IV: 200 mg/kg/day in 3 or 4 injections until improvement is seen, then change to oral treatment with **amoxicillin** PO: 100 mg/kg/day in 2 or 3 divided doses to complete 10 days of treatment

Acute laryngitis

Laryngitis is an acute infection of the laryngeal mucosa of viral or sometimes bacterial origin.

Clinical features common to all laryngitis

– Inspiratory dyspnoea with cough and hoarse voice. Chest indrawing and stridor may be present.
– Signs of serious illness: sweating, tachycardia, cyanosis, altered level of consciousness.

Examine children in a sitting position. Do not lay children down: there is a risk of respiratory airway obstruction.

Aetiology and treatment

Children over 6 months

1st case: rapid onset dyspnoea (over a few hours)

– **Acute epiglottitis** due to *Haemophilus influenzae*: sudden onset, severe dyspnoea, chest indrawing, high fever, cervical lymphadenopathy. The child is sitting, breathing through the mouth, drooling clear saliva which he cannot swallow due to dysphagia. The overall condition may deteriorate very quickly.
  • Avoid examining the larynx (risk of respiratory arrest), do not lay the child down, keep him in a sitting position.
  • Have the child breathe in a humid environment (next to a bowl of water or a wet towel).
  • Antibiotic treatment:
  ceftriaxone IM: 100 mg/kg/day in 2 injections for 5 days
  or, failing that,
  ampicillin IV: 200 mg/kg/day in 3 or 4 injections, change as soon as possible to oral treatment with **amoxicillin** PO: 100 mg/kg/day in 2 or 3 divided doses to complete 5 days of treatment
  or
  chloramphenicol IV: 100 mg/kg/day in 3 injections, change as soon as possible to oral treatment, at the same dosages to complete 5 days of treatment
  • If a patient has severe respiratory distress: intubation in a specialised setting, or failing that, tracheotomy.

– **Spasmodic laryngitis** in a child with rhinitis or measles: sudden, nocturnal onset with coughing fits followed by periods of suffocation and inspiratory dyspnoea. The child may develop stridor. The voice remains hoarse after the attack. The child remains afebrile.
  • Monitor the child, try to keep him calm. Have him breathe in a humid environment (near a bowl of water or wet towel).

- Nasal irrigation with 0.9% sodium chloride or Ringer Lactate, 4 to 6 times/day to clear the airway.
- An antihistamine may be given for 3 days:
  promethazine PO
  Children from 2 to 5 years: 5 to 15 mg once daily or in 2 divided doses
  Children from 5 to 10 years: 10 to 25 mg once daily or in 2 divided doses
  Children over 10 years: 25 to 50 mg once daily or in 2 divided doses
  or
  chlorphenamine PO
  Children from 1 to 2 years: 1 mg 2 times daily
  Children from 2 to 6 years: 1 mg 4 to 6 times daily
  Children from 6 to 12 years: 2 mg 4 to 6 times daily
  Adults: 4 mg 4 to 6 times daily
- In children with severe dyspnoea:
  dexamethasone IM: 0.1 to 0.2 mg/kg as a single dose
  or **hydrocortisone** IM: 1 mg/kg as a single dose

2nd case: progressive onset dyspnoea (over more than 24 hours)

– **Viral subglottitis**: the onset is frequently nocturnal, the dyspnoea is typical, the cry and cough have a raucous sound, but expiration is unobstructed.
  - Monitor the child, try to keep him calm. Have him breathe in a humid environment (near a bowl of water or wet towel).
  - **dexamethasone** IM: 0.1 to 0.2 mg/kg or **hydrocortisone** IM: 1 mg/kg, to be repeated after 30 minutes if necessary
  - Antibiotics are not useful, except in cases of secondary infection (amoxicillin or cotrimoxazole).
  - In case of deterioration: intubation if possible, or, failing that, tracheotomy.

Note: exclude diphtheria (see *Diphtheria*, page 55) and retropharyngeal abscess.

Adults

– Usually viral: treatment is symptomatic (paracetamol or acetylsalicylic acid PO).

– Very rarely, epiglottitis due to *Haemophilus influenzae*, diphtheria or retropharyngeal abscess: same clinical signs and treatment as for children.

– Also consider laryngeal tuberculosis in a patient with tuberculosis, or cancer of the larynx, particularly if the patient smokes.

Acute pharyngitis

Acute inflammation of the tonsils and pharynx. The majority of cases are of viral origin and do not require antibiotic treatment.
Group A streptococcus is the main bacterial cause, and mainly affects children age 3 to 14 years. Acute rheumatic fever, a serious late complication of streptococcal pharyngitis, is common in developing countries, and can be prevented with antibiotic therapy.
One of the main objectives in assessing acute pharyngitis is to identify patients requiring antibiotic treatment.

Clinical features

– Features common to all types of pharyngitis:
Throat pain and dysphagia (difficulty swallowing), with or without fever.

– Specific features, depending on the cause:

Common forms:
- *Erythematous* (red throat) or *exudative* (red throat and whitish exudate) *pharyngitis*:
Since this appearance is common to both viral and streptococcal pharyngitis, other criteria should be considered to distinguish between them:
In children under 3 years, streptococcal pharyngitis is rare and pharyngitis is almost exclusively viral.
In children from 3 to 14 years, the presence of at least 3 of the 4 following features [absence of cough, fever above 38°C, at least one enlarged and tender anterior cervical lymph node, presence of an exudate] favours streptococcal pharyngitis. Conversely, presence of cough, runny nose, conjunctivitis or enlarged posterior cervical lymph nodes favours viral pharyngitis.
In patients over 14 years, the probability of streptococcal pharyngitis is low. Infectious mononucleosis (IM) due to the Epstein-Barr virus should be suspected in adolescents and young adults with extreme fatigue, generalized adenopathy and often splenomegaly.
Erythematous or exudative pharyngitis may also be associated with gonococcal or primary HIV infection. In these cases, the diagnosis is mainly prompted by the patient's history.
- *Pseudomembranous pharyngitis* (red tonsils/pharynx covered with an adherent grayish white false membrane): see *diphtheria*, page 55.

Less common forms:
- *Vesicular pharyngitis* (clusters of tiny blisters on the tonsils): always viral (coxsackie virus or primary herpetic infection).
- *Ulcero-necrotic pharyngitis*: hard and painless syphilitic chancre of the tonsil; tonsillar ulcer soft on palpation in a patient with poor oral hygiene and malodorous breath (Vincent tonsillitis).

– Local complications:
Peritonsillar abcess: fever, intense pain, hoarse voice, trismus (limitation of mouth opening), unilateral deviation of the uvula.

Treatment

– Treat fever and pain in all cases (paracetamol PO, page 26)

– Viral pharyngitis is usually a self-limited illness. Spontaneous resolution typically occurs within a few days (or weeks, for IM): no antibiotic therapy.

– Choice of antibiotic treatment for streptococcal pharyngitis:

  • If single-use injection equipment is available, benzathine benzylpenicillin is the drug of choice as streptococcus A resistance to penicillin remains rare; it is the only antibiotic proven effective in reducing the incidence of rheumatic fever; and the treatment is administered as a single dose.
  benzathine benzylpenicilin IM
  Children under 6 years: 600 000 IU as a single dose
  Children over 6 years and adults: 1.2 MIU as a single dose

  • Penicillin V is the oral reference treatment, but poor adherence is predictable due to the length of treatment.
  phenoxymethylpenicilin (**penicillin V**) PO for 10 days
  Children under 1 year: 250 mg/day in 2 divided doses
  Children from 1 to 5 years: 500 mg/day in 2 divided doses
  Children from 6 to 12 years: 1 g/day in 2 divided doses
  Adults: 2 g/day in 2 divided doses

  • Amoxicillin is an alternative and the treatment has the advantage of being relatively short. However, it can cause adverse skin reactions in patients with undiagnosed IM and thus should be avoided when IM has not been excluded.
  amoxicillin PO for 6 days
  Children: 50 mg/kg/day in 2 divided doses
  Adults: 2 g/day in 2 divided doses

  • Resistance to macrolides is frequent, erythromycin and azithromycin should be reserved for penicillin allergic patients. Poor adherence with erythromycin is predictable due to the length of treatment. Azithromycin treatment has the advantage of being short.
  erythromycin PO for 10 days
  Children: 30 to 50 mg/kg/day in 2 to 3 divided doses
  Adults: 2 to 3 g/day in 2 to 3 divided doses
  or
  azithromycin PO for 3 days
  Children: 20 mg/kg once daily
  Adults: 500 mg once daily

– Gonococcal or syphilitic pharyngitis: same treatment as for genital gonorrhoea and syphilis

– Diphtherial pharyngitis: see *diphtheria*, page 55

– Vincent tonsillitis: penicillin V or erythromycin as above

– Peritonsillar abscess: refer for surgical drainage

Diphtheria

Diphtheria is a bacterial infection due to *Corynebacterium diphtheriae*, characterized by local proliferation (most commonly ENT) of the bacteria, and systemic diffusion of the diphtheria toxin through the body.
Transmission is by direct contact with an infected person.

Clinical features

– Incubation period: 3 to 5 days
– Local signs:
  • febrile tonsillitis with pseudomembranes (grey, tough and very sticky false membranes) sometimes accompanied by signs of serious illness: high fever (greater than 39°C), oliguria, cervical oedema, enlarged cervical lymph glands and signs of haemorrhage (cervical or thoracic purpura, gingival bleeding, epistaxis).
  • laryngitis, most commonly secondary to the tonsillitis. Risk of death by asphyxiation.
  • other local signs: rhinitis (often unilateral); secondary infection of a skin lesion with *C. diphtheriae*.
– General signs due to the toxin:
  • mycocarditis: clinically detectable arrhythmias or cardiac conduction defects in 25% of patients. These are more serious when appear early (from the 5th day).
  • neuropathies may occur 1 to 3 months after the onset of the disease: paralysis of the soft palate, respiratory muscles, limbs and accommodation.
  • more rarely: pneumonia, renal failure with oligo-anuria and haematuria.

Laboratory

Confirmation is made by isolating the toxic strain of *C. diphtheriae* from a throat swab.

Treatment (at hospital level)

– Strict isolation.
– Treatment with antitoxin serum: do not wait for bacteriological confirmation.
  For **diphtheria antitoxin** derived from horse serum, administer according to the Besredka method[1].
  Doses are given as a function of the severity of illness, and the delay in treatment:

	Dose in units	Administration route
Laryngitis or pharyngitis	20 000 to 40 000	Depends on the volume to be administered: IM or for volumes greater than 20 000 units IV infusion in 200 ml 0.9% NaCl, over one hour
Rhinopharyngitis	40 000 to 60 000	
Serious forms or if treatment is started more than 48 hours after onset of symptoms	80 000 and up to 100 000	

[1] Besredka method: inject 0.1 ml SC and wait 15 minutes. If there is no allergic reaction (no erythema at the injection site or a flat erythema of less than 0.5 in diameter, inject a further 0.25 ml SC. If there is no reaction after 15 minutes, inject the rest of the product IM or IV depending on the volume to be administered. In the event of an anaphylactic reaction, give **epinephrine** (**adrenaline**) IM, to be repeated every 5 minutes if there is no improvement:
Infants and children: 0.01 mg/kg/injection
Adults: 0.25 to 0.75 mg/injection
Insert an IV line. In the event of anaphylactic shock, see *Shock*, page 17.

– Antibiotic treatment:
benzathine benzylpenicillin IM
Children under 6 years: 600 000 IU as a single dose
Children over 6 years and adults: 1.2 MIU as a single dose
or
procaine benzylpenicillin IM
Children: 50 000 IU/kg once daily for 7 days
Adults: 1.2 MIU once daily for 7 days

For penicillin-allergic patients:
erythromycin PO
Children: 50 mg/kg/day in 2 to 3 divided doses for 7 days
Adults: 2 to 3 g/day in 2 to 3 divided doses for 7 days

– Urgent intervention to secure an airway (intubation, tracheotomy) may be necessary in the event of laryngeal obstruction or cardiac or neurologic complications.

Management of close contacts

– Nose and throat cultures.
– Daily clinical monitoring (throat examination and temperature) for 7 days.
– Quarantine
– Antibiotic treatment: see above.
– Verify vaccination status:
  • less than 3 injections: complete with DTP, DT or Td depending on age,
  • 3 injections: if the last injection was given more than one year before, give a booster dose.

The same precautions should be taken for contacts of healthy carriers.

Prevention

There are 3 combined vaccines:
DTP: diphtheria-tetanus-pertussis
DT: diphtheria (30 IU) and tetanus, for those under 7 years of age
Td: diphtheria (3 IU) and tetanus, for those over 7 years of age

– In the event of an epidemic, mass vaccination:
Update routine vaccinations with DTP for children under 3 years of age; DT for children from 3 to 6 years of age; Td for children over 7 years of age and adults.

– Routine vaccination (EPI). The recommendations vary according to the country. For information:
DTP: 3 doses at one month intervals before the age of 1 year, DTP booster one year later, and DT at 6 years of age followed by 3 more boosters at 10 year intervals.

Note: the disease does not give immunity. Update the vaccination of the patients once they have recovered. Vaccination does not prevent individuals from becoming carriers.

Otitis

Acute otitis externa

Diffuse inflammation of the external ear canal, due to bacterial or fungal infection. Common precipitants of otitis externa are maceration, trauma of the ear canal or presence of a foreign body or dermatologic diseases (such as eczema, psoriasis).

Clinical features

– Ear canal pruritus or ear pain, often severe and exacerbated by motion of the pinna; feeling of fullness in the ear; clear or purulent ear discharge or no discharge
– Otoscopy:
  • diffuse erythema and edema, or infected eczema, of the ear canal
  • look for a foreign body
  • if visible, the tympanic membrane is normal (swelling, pain or secretions very often prevent adequate visualization of the tympanic membrane)

Treatment

– Remove a foreign body, if present.
– Treatment of pain: paracetamol and/or ibuprofen PO (page 29).
– Local treatment (usually 5 to 7 days):
  Remove skin debris and secretions from the auditory canal by gentle dry mopping (use a dry cotton bud or a small piece of dry cotton wool). In addition, 0.5% gentian violet can be applied once a day, using a cotton bud.
  Consider ear irrigation (0.9% sodium chloride, using a syringe) only if the tympanic membrane can be fully visualised and is intact (no perforation). Otherwise, ear irrigation is contra-indicated.

Acute otitis media (AOM)

Acute inflammation of the middle ear, due to viral or bacterial infection, very common in children under 3 years, but uncommon in adults.
The principal causative organisms of bacterial otitis media are *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis* and in older children, *Streptococcus pyogenes*.

Clinical features

– Rapid onset of ear pain (in infants: crying, irritability, sleeplessness, reluctance to nurse) and ear discharge (otorrhoea) or fever.
– Other signs such as rhinorrhoea, cough, diarrhoea or vomiting are frequently associated, and may confuse the diagnosis, hence the necessity of examining the tympanic membranes.

– Otoscopy: bright red tympanic membrane (or yellowish if rupture is imminent) and presence of pus, either externalised (drainage in ear canal if the tympanic membrane is ruptured) or internalised (opaque or bulging tympanic membrane). The combination of these signs with ear pain or fever confirms the diagnosis of AOM.
  Note:
  The following otoscopic findings are not sufficient to make the diagnosis of AOM:
  • A red tympanic membrane alone, with no evidence of bulging or perforation, is suggestive of viral otitis in a context of upper respiratory tract infection, or may be due to prolonged crying in children or high fever.
  • The presence of air bubbles or fluid behind an intact tympanic membrane, in the absence of signs and symptoms of acute infection, is suggestive of otitis media with effusion (OME).
– Complications, particularly in high-risk children (malnutrition, immunodeficiency, ear malformation) include chronic suppurative otitis media, and rarely, mastoiditis, brain abscess or meningitis.

Treatment

– In all cases:
  • Treatment of pain and fever: paracetamol PO, page 26.
  • Ear irrigation is contra-indicated if the tympanic membrane is ruptured, or when the tympanic membrane cannot be fully visualised. Ear drops are not indicated.

– Indications for antibiotic therapy:
  • Antibiotics are prescribed in children less than 2 years, children whose assessment suggests severe infection (vomiting, fever > 39°C, severe pain) and children at risk of unfavourable outcome (malnutrition, immunodeficiency, ear malformation).
  • For other children:
    1) If the child can be re-examined within 48 to 72 hours: it is preferable to delay antibiotic prescription. Spontaneous resolution is probable and a short symptomatic treatment of fever and pain may be sufficient. Antibiotics are prescribed if there is no improvement or worsening of symptoms after 48 to 72 hours.
    2) If the child cannot be re-examined: antibiotics are prescribed.
  • For children treated with antibiotics: advise the mother to bring the child back if fever and pain persist after 48 hours.

– Choice of antibiotic therapy:
  • Amoxicillin is the first-line treatment:
    amoxicillin PO: 80 to 100 mg/kg/day in 2 to 3 divided doses for 5 days
  • Amoxicillin/clavulanic acid is used as second-line treatment, in the case of treatment failure. Treatment failure is defined as persistence of fever and/or ear pain after 48 hours of antibiotic treatment.
    amoxicillin/clavulanic acid PO (dose expressed in amoxicillin): 45 mg/kg/day in 2 to 3 divided doses for 5 days

  Persistence of a ear drainage alone, without fever and pain, in a child who has otherwise improved (reduction in systemic symptoms and local inflammation) does not warrant a change in antibiotic therapy. Clean ear canal by gentle dry mopping until no more drainage is obtained.

- Azithromycin or erythromycin should be reserved for very rare penicillin-allergic patients, as treatment failure (resistance to macrolides) is frequent.
  azithromycin PO
  Children over 6 months: 10 mg/kg once daily for 3 days
  erythromycin PO
  30 to 50 mg/kg/day in 2 to 3 divided doses for 10 days

Chronic suppurative otitis media (CSOM)

Chronic bacterial infection of the middle ear with persistent purulent discharge through a perforated tympanic membrane.
The principal causative organisms are *Pseudomonas aeruginosa*, *Proteus spp*, staphylococcus, other Gram negatives and anaerobes.

Clinical features

– Purulent discharge for more than 2 weeks, often associated with hearing loss or even deafness; absence of pain and fever
– Otoscopy: perforation of the tympanic membrane and purulent exudate
– Complications:
  • Consider a superinfection (AOM) in the case of new onset of fever with ear pain, and treat accordingly.
  • Consider mastoiditis in the case of new onset of high fever, severe ear pain and/or tender swelling behind the ear, in a patient who appears significantly unwell.
  • Consider brain abscess or meningitis in the case of impaired consciousness, neck stiffness and focal neurological signs (e.g. facial nerve paralysis).

Treatment

– Remove secretions from the auditory canal by gentle dry mopping (use a dry cotton bud or a small piece of dry cotton wool) then apply **ciprofloxacin** (ear drops): 2 drops twice daily, until no more drainage is obtained (max. 4 weeks).
– Complications:
  • Chronic mastoiditis is a medical emergency that requires prompt hospitalisation, prolonged antibiotic treatment that covers the causative organisms of CSOM (**ceftriaxone** IM 10 days + **ciprofloxacin** PO for 14 days), atraumatic cleaning of the ear canal; surgical treatment may be required. Before transfer to hospital, if the patient needs to be transferred, administer the first dose of antibiotics.
  • Meningitis: see page 165.

Whooping cough (pertussis)

Whooping cough is a highly contagious bacterial infection of the lower respiratory tract, of prolonged duration, due to *Bordetella pertussis*.
B. pertussis is transmitted through inhalation of droplets spread by infected individuals (coughing, sneezing).
The majority of cases arise in non-vaccinated or incompletely vaccinated individuals. Whooping cough affects all age groups. Signs and symptoms are usually minor in adolescents and adults. As a result the infection may be ignored, thus contributing to the spread of *B. pertussis* and infection in infants and young children, in whom the illness is severe.

Clinical features

After an incubation period of 7 to 10 days, the illness evolves in 3 phases:
– Catarrhal phase (1 to 2 weeks): coryza and cough. At this stage, the illness is indistinguishable from a minor upper respiratory infection.
– Paroxysmal phase (1 to 6 weeks):
  • Typical presentation: cough of at least 2 weeks duration, occurring in characteristic bouts (paroxysms), followed by a laboured inspiration causing a distinctive sound (whoop), or vomiting. Fever is absent or moderate, and the clinical exam is normal between coughing bouts; however, the patient becomes more and more fatigued.
  • Atypical presentations:
    - Infants under 6 months: paroxysms are poorly tolerated, with apnoea, cyanosis; coughing bouts and whoop may be absent.
    - Adults: prolonged cough, often without other symptoms.
  • Complications:
    - Major: in infants, secondary bacterial pneumonia (new-onset fever is an indicator); malnutrition and dehydration triggered by poor feeding due to cough and vomiting ; rarely, seizures, encephalopathy; sudden death.
    - Minor: subconjunctival haemorrhage, petechiae, hernias, rectal prolapse
– Convalescent phase: symptoms gradually resolve over weeks or months.

Management and treatment

Suspect cases

– Routinely hospitalise infants less than 3 months, as well as children with severe cases. Infants under 3 months must be monitored 24 hours per day due to the risk of apnoea.
– When children are treated as outpatients, educate the parents about signs that should lead to re-consultation (fever, deterioration in general condition, dehydration, malutrition, apnoea, cyanosis).
– Respiratory isolation (until the patient has received 5 days of antibiotic treatment):
  • at home: avoid contact with non-vaccinated or incompletely vaccinated infants;
  • in congregate settings: exclusion of suspect cases;
  • in hospital: single room or grouping together of cases away from other patients (cohorting).

– Hydration and nutrition: ensure children < 5 years are well hydrated; breastfeeding should continue. Advise mothers to feed the child frequently in small quantities after coughing bouts and the vomiting which follows. Monitor the weight of the child during the course of the illness, and consider food supplements for several weeks after recovery.

– Antibiotic therapy:
Antibiotic treatment is indicated in the first 3 weeks after onset of cough. Infectivity is virtually nil after 5 days of antibiotic treatment.

	Antibiotic	Child	Adult
First line	**azithromycin** PO once daily, for 5 days	0-5 months: 10 mg/kg/day ≥ 6 months: D1 10 mg/kg (max 500 mg) D2-D5 5 mg/kg/d (max 250 mg/d)	D1 500 mg D2-D5 250 mg/day
Alernative	**erythromycin** PO in 3 divided doses, for 7 days	50 mg/kg/day (avoid in infant < 1 month of age)	1 g/day
	cotrimoxazole PO in 2 divided doses, for 14 days	40 mg/kg/day SMX + 8 mg/kg/day TMP (avoid in infant < 1 month of age, and last month of pregnancy)	1600 mg/day SMX + 320 mg/day TMP

– For hospitalised children:
  • Place the child in a semi-reclining position (± 30°).
  • Oro-pharyngeal suction if needed.

Post-exposure prophylaxis

– Antibiotic prophylaxis (same treatment as for suspect cases) is recommended for unvaccinated or incompletely vaccinated infants of less than 6 months, who have had contact with a suspect case.
– Isolation of contacts is not necessary.

Note: pertussis vaccination should be updated in all cases (suspects and contacts). If the primary series has been interrupted, it should be completed, rather than restarted from the beginning.

Prevention

Routine vaccination with polyvalent vaccines containing pertussis antigens (e.g. DTP, or DTP + Hep B, or DTP + Hib + Hep B) from the age of 6 weeks or according to national protocol.
Neither vaccination nor natural disease confers lasting immunity. Booster doses are necessary to reinforce immunity and reduce the risk of developing disease and transmitting it to young children.

Bronchitis

Acute bronchitis

An acute inflammation of the bronchial mucosa, most commonly of viral origin. In older children it can be caused by *Mycoplasma pneumoniae*. In children over 2 years of age with repetitive acute bronchitis or 'wheezing' bronchitis, consider asthma (see *Asthma*, page 73). In children under 2 years of age, consider bronchiolitis (see *Bronchiolitis*, page 64).

Clinical features

Often begins with a rhinopharyngitis that descends progressively: pharyngitis, laryngitis, tracheitis.
– Heavy cough, dry at the beginning then becoming productive
– Low-grade fever
– No tachypnoea, no dyspnoea
– On pulmonary auscultation: bronchial wheezing

Treatment

– Fever: paracetamol PO (see *Fever*, page 26).
– Keep the patient hydrated, humidify air (with a bowl of water or a wet towel).
– Children: nasal irrigation with 0.9% sodium chloride or Ringer Lactate, 4 to 6 times/day to clear the airway.
– Antibiotic treatment is not useful for patients in good overall condition with rhinopharyngitis or influenza.
– Antibiotic treatment is indicated only if:
  • the patient is in poor general condition: malnutrition, measles, rickets, severe anaemia, cardiac disease, elderly patient etc.
  • if the patient has dyspnoea, fever greater than 38.5°C and purulent expectorations: a secondary infection with *Haemophilus influenzae* or with pneumococcus is probable.

amoxicillin PO
Children: 100 mg/kg/day in 2 or 3 divided doses for 5 days
Adults: 3 g/day in 2 or 3 divided doses for 5 days
or
chloramphenicol PO
Children over 2 months: 50 to 100 mg/kg/day in 3 divided doses for 5 days
Adults: 3 g/day in 3 divided doses for 5 days

Chronic bronchitis

A chronic inflammation of the bronchial mucosa due to irritation (tobacco, pollution), allergy (asthma) or infection (repetitive acute bronchitis). It may develop into chronic obstructive pulmonary disease.

Clinical features

– Productive cough for 3 consecutive months per year for 2 successive years.
– No dyspnoea at onset. Dyspnoea develops after several years, first on exertion, then becoming persistent.
– On pulmonary auscultation: bronchial wheeze (always exclude tuberculosis).

A patient with an acute exacerbation of chronic bronchitis presents with:
– Onset or increase of dyspnoea
– Increased volume of sputum
– Purulent sputum

Treatment

– Antibiotic treatment is not useful in treating simple chronic bronchitis.
– Antibiotic treatment may be useful, for patients in a poor general condition only, for acute exacerbations of chronic bronchitis (see *Acute bronchitis*, previous page).
– Discourage smoking and other irritating factors.

Bronchiolitis

Bronchiolitis is an epidemic and seasonal viral infection of the lower respiratory tract in children less than 2 years of age, characterised by bronchiolar obstruction.
Respiratory syncytial virus (RSV) is responsible for 70% of cases of bronchiolitis. Transmission of RSV is direct, through inhalation of droplets (coughing, sneezing), and indirect, through contact with hands or materials contaminated by infected secretions.
In the majority of cases, bronchiolitis is benign, resolves spontaneously (relapses are possible), and can be treated on an outpatient basis.
Severe cases may occur, which put the child at risk due to exhaustion or secondary bacterial infection. Hospitalisation is necessary when signs/criteria of severity are present (10 to 20% of cases).

Clinical features

– Tachypnoea, dyspnoea, wheezing, cough; profuse, frothy, obstructive secretions.
– On auscultation: prolonged expiration with diffuse, bilateral wheezes; sometimes diffuse fine, end-inspiratory crackles.

Rhinopharyngitis, with dry cough, precedes these features by 24 to 72 hours; fever is absent or moderate.

– Signs of severity:
  • Significant deterioration in general condition, toxic appearance (pallor, greyish colouration)
  • Apnoea, cyanosis (check lips, buccal mucosa, fingernails)
  • Respiratory distress (nasal flaring, sternal and chest wall indrawing)
  • Anxiety and agitation (hypoxia), altered level of consciousness
  • Respiratory rate > 60/min
  • Decreased respiratory distress and slow respirations (< 30/min below the age of 1 year and < 20/min below the age of 3 years, exhaustion). Exercise caution in interpreting these signs as indicators of clinical improvement.
  • Sweats, tachycardia at rest and in the absence of fever
  • Silence on auscultation (severe bronchospasm)
  • Difficulty drinking or sucking (reduced tolerance for exertion)

Treatment

Treatment is symptomatic. Obstructive signs and symptoms last for about 10 days; cough may persist for 2 weeks longer.

Hospitalise children with one of the following criteria:
– Presence of any sign of severity
– Pre-existing pathology (cardiac or pulmonary disease, malnutrition, HIV, etc.)

Consider hospitalisation on a case-by-case basis in the following situations:
– Associated acute pathology (viral gastro-enteritis, bacterial infection, etc.)
– Age less than 3 months

In all other cases, the child may be treated at home, provided the parents are taught how to carry out treatment, and what signs of severity should lead to re-consultation.

Outpatient treatment

– Nasal irrigation with 0.9% NaCl before each feeding (demonstrate the technique to the mother)[1].
– Small, frequent feedings to reduce vomiting triggered by bouts of coughing.
– Increased fluids if fever and/or significant secretions are present.
– Treat fever (see page 26).
– Handle the patient the patient as little as possible and avoid unnecessary procedures.

Hospitalisation

– In all cases:
  • Place the infant in a semi-reclining position (± 30°).
  • Nasal irrigation, small, frequent feeds, treatment of fever: as for outpatient treatment.
  • Gentle oro-pharyngeal suction if needed.
  • Monitor fluid intake: normal requirements are 80 to 100 ml/kg/day + 20 to 25 ml/kg/day with high fever or very profuse secretions.
– According to symptoms:
  • Humidified nasal oxygen (1 to 2 litres/min).
  • When there is vomiting or significant fatigue when sucking, fluid requirements may be administered by nasogastric tube (small volumes on a frequent basis) or the IV route, for the shortest possible time. Avoid breastfeeding or oral feeds in children with severe tachypnoea, but do not prolong NG feeds (respiratory compromise) or IV infusions any longer than necessary.
  • Bronchodilator therapy: this therapy may be considered after a trial treatment has been given (**salbutamol** inhaler, 100 micrograms/puff: 2 to 3 puffs with spacer, repeated twice at an interval of 30 minutes). If inhaled salbutamol appears effective in relieving symptoms, the treatment is continued (2 to 3 puffs every 6 hours in the acute phase, then gradual reduction as recovery takes place). If the trial is ineffective, the treatment is discontinued.
  • Antibiotics are not indicated unless there is concern about complications such as secondary bacterial pneumonia.

Prevention and control

The risk of transmission of the virus is increased in hospital settings:
– Children with bronchiolitis should be grouped together, away from other children (cohorting).
– As infection is most commonly transmitted by the hands, the most important prevention measure is hand-washing after any contact with patients, and objects or surfaces in contact with patients on which the virus may survive for several hours.
– In addition, staff should wear gowns, gloves and surgical masks when in contact with patients.

[2] Lie the child on his back, head turned to the side and instil 0.9% NaCl into the nose, one nostril at a time.

Acute pneumonia

Acute pneumonia is a viral, bacterial (pneumococcus, *Haemophilus influenzae*, *Mycoplasma pneumoniae*) or parasitic (*Pneumocystis carinii* in HIV infected patients) infection of the pulmonary alveoli.

Pneumonia in children under 5 years of age

Clinical features

The most common causes are viruses, pneumococci and *Haemophilus influenzae*.
Pneumonia should be suspected in all children who present with **cough** or **difficulty breathing**.

- Often high fever (great than 39°C), but the child may present with low-grade fever or be afebrile (often a sign of serious illness).
- Clinical examination must be done on a calm child in order to correctly count the respiratory rate and to look for signs of serious illness.
- Pulmonary auscultation is often difficult: dullness with diminished vesicular breath sounds, crepitations and sometimes bronchial breathing or normal pulmonary auscultation.
- Respiratory rate: because it fluctuates, respiratory rate (RR) should be measured over 1 minute. Use a WHO timer or a watch with a second hand.
  A child has tachypnoea (increased respiratory rate) if:
  RR > 60 breaths/minute in children under 2 months
  RR > 50 breaths/minute in children from 2 to 11 months
  RR > 40 breaths/minute in children from 12 months to 5 years

Signs of serious illness (in a calm child who is either resting or asleep) are:

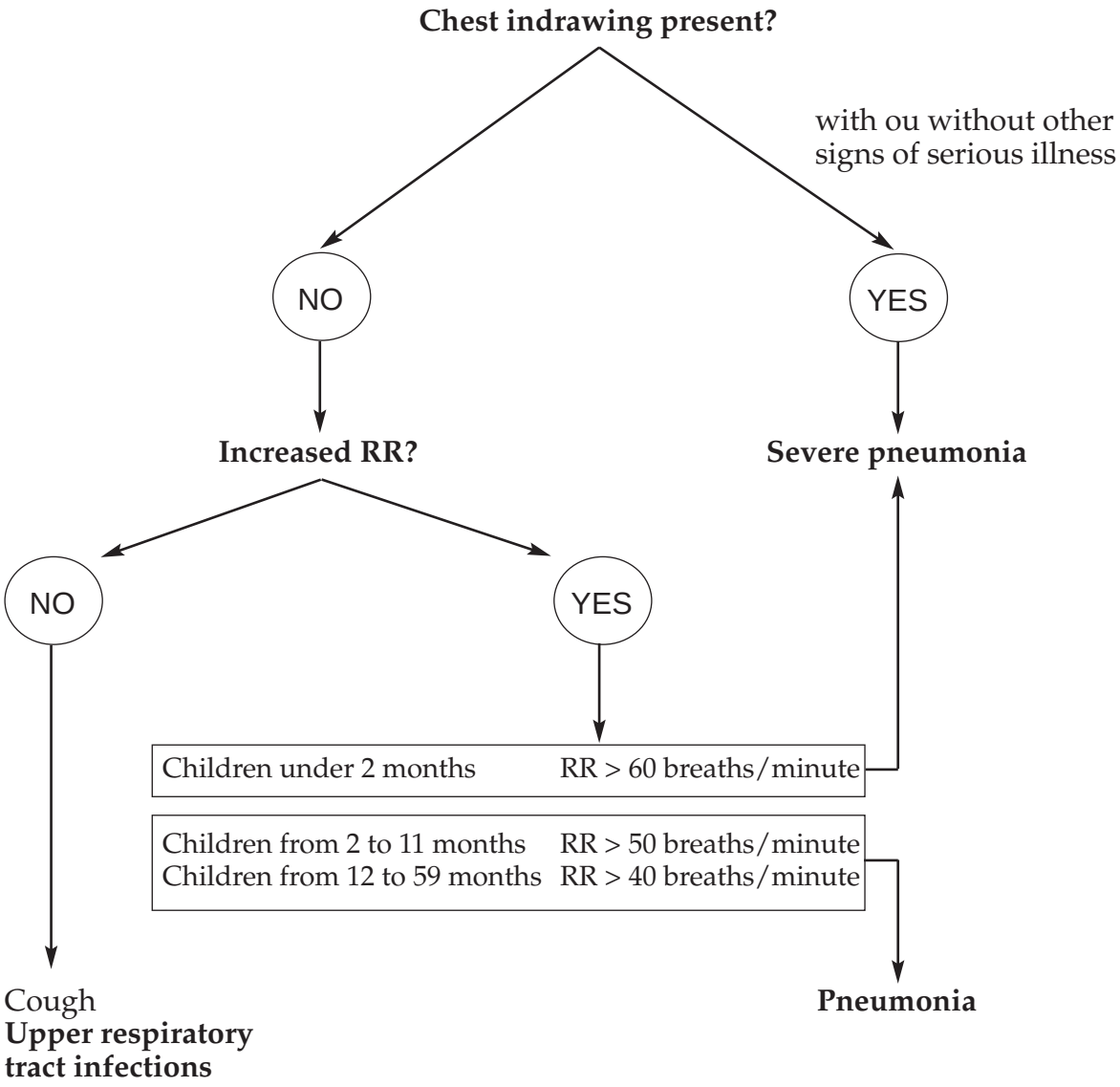
- Chest indrawing: the inferior thoracic wall depresses on inspiration as the superior abdomen expands
- RR > 60 breaths/minute in children under 2 months
- Cyanosis (examine the lips, buccal membranes and fingernails)
- Nasal flaring
- The child refuses to drink or breastfeed
- The child is abnormally sleepy or difficult to wake
- Stridor (hoarse noise on inspiration)
- Grunting (a short repetitive noise produced by a partial closure of the vocal cords) on expiration
- Severe malnutrition

Notes:

- In children, fever may cause the RR to increase by 10 breaths/minute with each increase of 1°C.
- In malnourished children, the RR thresholds should be decreased by 5 breaths/minute from those listed above.
- Chest indrawing is not significant if it is not clearly visible and present at all times. If it is only observed when a child is upset or feeding and is not visible when the child is resting, there is no chest indrawing.

– In children under 2 months of age, moderate chest indrawing is normal as the thoracic wall is flexible.
– If only the soft tissues between the ribs or above the clavicles depress, there is no chest indrawing.
– Exclude severe malaria which may also cause respiratory signs with cough and tachypnoea. Clinical anaemia, splenomegaly, and full, deep breathing are suggestive of severe malaria. Unilateral signs on auscultation, the presence of crepitations and chest indrawing are more suggestive of pneumonia.
– In patients with painful abdominal swelling and diarrhoea, consider staphylococcal pneumonia (see page 72).

Diagnosis of pneumonia in children under 5 presenting with cough or difficulty breathing:



Treatment

Severe pneumonia (at hospital level)

In children under 2 months of age

Treatment of choice is:
ceftriaxone IM or slow IV[1]
Newborns: 50 mg/kg by infusion over 60 minutes, once daily
Children over 1 month: 50 mg/kg by IM or slow IV injection once daily (over 3 minutes) for a minimum of 3 days, then change to oral treatment with **amoxicillin** PO: 100 mg/kg/day in 3 divided doses to complete 7 to 10 days of treatment

or, failing that,
ampicillin IV or IM: 100 mg/kg/day in 3 or 4 injections. Once the fever has disappeared or there are no more signs of serious illness, change to oral treatment with amoxicillin at the same dosage, to complete 7 to 10 days of treatment.
+ **gentamicin** IM: 3 to 6 mg/kg once daily for 7 days

If there is no improvement or if the child's condition is deteriorating after 48 hours of correct treatment, consider staphylococcal pneumonia (see page 72).

Children from 2 months to 5 years of age

ampicillin IV or IM + **gentamicin** IM at the same doses as for infants under 2 months (see above).
or
chloramphenicol IV or IM: 100 mg/kg/day in 3 injections for a minimum of 5 days, then change to oral treatment at the same dosage to complete 7 to 10 days of treatment

If there is no improvement or if the child's condition is deteriorating after 48 hours of correct treatment, consider staphylococcal pneumonia (see page 72).

When the correct administration of injectable chloramphenicol or ampicillin 3 times daily cannot be guaranteed, the antibiotic of choice is **ceftriaxone** IV or IM, followed by **amoxicillin** PO, at the same dosage as for children under 2 months (see above).

Adjuvant therapy for all patients

– Fever: give paracetamol PO (see *Fever*, page 26).
– Nasal irrigation with 0.9% sodium chloride or Ringer Lactate to clear the airway.
– Oxygen at a rate of 1 litre/minute.
– Maintain adequate hydration and nutrition: in children under 12 months, milk (use a breast pump when appropriate) and water by spoon on demand. In children over 12 months, give food, milk and water on demand.
– If the child refuses to eat, use a nasogastric tube. In children under 12 months: 5 ml/kg/hour. In children over 12 months: 3 to 4 ml/kg/hour; alternate milk, water and **ORS** if necessary.
– Children under 2 months: keep warm.

[1] The solvent of ceftriaxone for IM injection contains lidocaine. Ceftriaxone reconstituted using this solvent must NEVER be administered by IV route. For IV administration, water for injection must always be used

Pneumonia with no signs of serious illness (at dispensary level, except for young infants)

Children under 2 months of age

Treat in hospital as severe pneumonia (see above).

Children from 2 months to 5 years of age

Haemophilus influenzae is common at this age, as is pneumococcus which is more serious:
amoxicillin PO: 100 mg/kg/day in 3 divided doses for 5 days

Follow-up in 48 hours or sooner if the child's condition deteriorates:
– If the child is improving: continue with the same antibiotic to complete treatment.
– If there is no improvement despite correct treatment, change to **chloramphenicol** PO: 100 mg/kg/day in 3 divided doses for 5 days.
– If the child's condition is deteriorating: hospitalise and treat as severe pneumonia.

Pneumonia in children over 5 years and adults

Clinical features

The most common causes are viruses, pneumococci, and *Mycoplasma pneumoniae*.
– Cough, with or without purulent sputum, fever, thoracic pain, tachypnoea
– On pulmonary auscultation: decreased vesicular breath sounds, dullness, localised foci of crepitations, sometimes bronchial wheeze.

Sudden onset with high fever (higher than 39°C), thoracic pain and oral herpes are suggestive of pneumoccal infection. Symptoms may be confusing, particularly in children with abdominal pain, meningeal syndrome etc.

Signs of serious illness (severe pneumonia):
– Cyanosis (examine the lips, buccal mucosa, and the fingernails)
– Nasal flaring
– Intercostal or subclavial indrawing
– RR > 30 breaths/minute
– Heart rate > 125 beats/minute
– Altered level of consciousness (drowsiness, confusion)

Those at risk include the elderly, immunocompromised patients (severe malnutrition, HIV infection with CD4 < 200 cells/mm^3 or splenectomy) or patients suffering from heart failure, sickle cell disease or severe chronic bronchitis.

Treatment

Severe pneumonia (at hospital level)

benzylpenicillin procaine + benzylpenicillin IM
Children: 100 000 IU/kg once daily for 2 to 3 days then, once the fever or signs of severe illness have disappeared, change to oral treatment with **amoxicillin** PO: 100 mg/kg/day in 3 divided doses to complete 7 days of treatment.
Adults: 3 to 4 MIU once daily for 2 to 3 days then, once the fever or signs of severe illness have disappeared, change to oral treatment with **amoxicillin** PO: 3 g/day in 3 divided doses to complete 7 days of treatment.
or
ampicillin IV or IM
Children: 100 mg/kg/day in 3 injections
Adults: 3 g/day in 3 injections
Once the fever or signs of severe illness have disappeared, change to oral treatment with **amoxicillin** PO at the same dosage to complete 7 days of treatment

If there is no improvement after 48 hours of correct treatment, change antibiotic treatment to:
chloramphenicol IV or IM
Children: 100 mg/kg/day in 3 injections for 2 to 3 days
Adults: 3 to 4 g/day in 3 injections for 2 to 3 days
Then change to oral treatment at the same dosage to complete 7 days of treatment.

When the correct administration of injectable chloramphenicol or ampicillin 3 times daily cannot be guaranteed, the antibiotic of choice is **ceftriaxone** IV or IM, followed by **amoxicillin** PO:
Children: same dosage as for children under 2 months (see page 68).
Adults: **ceftriaxone** IM or slow IV (over 3 minutes): 1 g once daily for a minimum of 3 days followed by **amoxicillin** PO: 3 g/day in 3 divided doses to complete 7 to 10 days of treatment.

Adjuvant therapy for all patients
– Fever (see *Fever*, page 26).
– Nasal irrigation with 0.9% sodium chloride or Ringer Lactate to clear the airway.
– Oxygen at a rate of 1 litre/minute.
– Maintain adequate hydration and nutrition. Use a nasogastric tube if necessary.

Pneumonia without signs of serious illness (at dispensary level)

Typical pneumonia (acute lobar pneumonia)

Pneumococcus is the most common cause.

benzylpenicillin procaine + benzylpenicillin IM
Children: 100 000 IU/kg once daily for 5 days
Adults: 3 to 4 MIU once daily for 5 days
or
amoxicillin PO
Children: 100 mg/kg/day in 3 divided doses for 5 days
Adults: 3 g/day in 3 divided doses for 5 days

Follow-up in 48 hours or sooner if the patient's condition deteriorates:
– if the patient is improving: continue with the same antibiotic to complete treatment.
– if the patient's condition is deteriorating: hospitalise and treat as severe pneumonia.

Persistent pneumonia

Consider an atypical pneumonia (*Mycoplasma pneumoniae*, *Chlamydia pneumoniae*).

erythromycin PO
Children: 50 mg/kg/day in 2 or 3 divided doses for 10 days
Adults: 2 to 3 g/day in 2 or 3 divided doses for 10 days

or, failing that,
doxycycline PO (contra-indicated in children under 8 years and pregnant or lactating women)
Children: 4 mg/kg/day in 2 divided doses for 10 days
Adults: 200 mg/day in 2 divided doses for 10 days

If signs persist after 2 consecutive treatments, consider tuberculosis (see *Tuberculosis*, page 78) or *Pneumocystis carinii* pneumonia (see *HIV infection and AIDS*, page 215).

Staphylococcal pneumonia

Pneumonia due to *Staphylococcus aureus*, specific to infants, often those in a poor general condition (malnutrition, skin lesions etc.). Staphylococcal pneumonia is a classic complication of measles.

Clinical features

– General signs: change in overall condition, grunting, pallor, high fever or hypothermia, frequently signs of shock (see *Shock*, page 17) and the presence of skin lesions (point of bacterial entry).

– Gastrointestinal signs: nausea, vomiting, diarrhoea, painful abdominal distention.

– Respiratory signs: dry cough, tachypnoea, signs of distress (nasal flaring, chest indrawing).

– Pulmonary auscultation: often normal. Sometimes dullness indicating pleural effusion.

If possible, take a chest x-ray: the presence of bullae confirms the diagnosis. Pleural effusion, often unilateral, may also be seen.

Treatment

Treatment is urgent as patients deteriorate quickly: hospitalise.

– Antibiotic treatment:
cloxacilline IV: 200 mg/kg/day in 3 injections + **gentamicin** IM or IV: 7.5 mg/kg once daily. When the child improves, administer cloxacilline PO to complete 10 to 14 days of treatment.
or
chloramphenicol IV (children over 2 months): 100 mg/kg/day in 3 injections. When the child improves, administer chloramphenicol PO to complete 10 to 14 days of treatment.

– Oral (or with a nasogastric tube) or intravenous hydration.

– Oxygen at a rate of 1 litre/minute.

– Local disinfection of skin lesions (see *Bacterial skin infections*, page 105).

– If there is significant pleural effusion: pleural tap with drainage (for pyopneumothorax; insert 2 drains, one anterior and one posterior) or without drainage (for suppurative pleurisy, make repetitive taps with an IV catheter).

Clinical evolution

– There is a serious risk of decompensation from pneumothorax or suppurative pleurisy or pyopneumothorax.

– On a paediatric ward, adequate equipment for urgent pleural drainage should always be available.

Asthma

Asthma is a chronic inflammatory disorder of the airways associated with airway hyper-responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing. These episodes are usually associated with airflow obstruction within the lung, often reversible, either spontaneously or with treatment.

Factors that precipitate/aggravate asthma include: allergens, infection, exercise, drugs (aspirin), tobacco, etc.

In young children, most initial episodes of asthma-like symptoms are associated with a respiratory tract infection, with no symptoms between infections. Wheezing episodes usually become less frequent with time; most of these children do not develop asthma.

Asthma attack (acute asthma)

Asthma attack is a substantial worsening of asthma symptoms. The severity and duration of attacks are variable and unpredictable.

Assessment of the severity of asthma attack

The severity of the asthma attack must be rapidly evaluated by the following clinical criteria. Not all signs are necessarily present.

Assessment of severity in children under 2 years and adults

MILD TO MODERATE ATTACK	SEVERE ATTACK	LIFE THREATENING ATTACK
Able to talk in sentences **Respiratory rate (RR)** Child 2-5 years ≤ 40/min Child > 5 years ≤ 30/min **Pulse** Child 2-5 years ≤ 140/min Child > 5 years ≤ 125/min and **No criteria of severity**	**Cannot complete sentences in one breath** or **Too breathless to talk or feed** **RR** Child 2-5 years > 40/min Child > 5 years > 30/min Adult ≥ 25/min **Pulse** Child 2-5 years > 140/min Child > 5 years > 125/min Adult ≥ 110/min **O_2 saturation ≥ 92%**	**Altered level of consciousness** (drowsiness, confusion, coma) **Exhaustion** **Silent chest** **Paradoxical thoracoabdominal movement** **Cyanosis** **Collapse** **Bradycardia in children or arrhythmia/hypotension in adults** **O_2 saturation < 92%**

Treatment

Treatment and follow-up depend on the severity of the attack and the patient's response:

Mild to moderate attack

– Reassure the patient; place him in a 1/2 sitting position.

– Administer:
  • **salbutamol** (aerosol): 2 to 4 puffs every 20 to 30 minutes, up to 10 puffs if necessary during the first hour. In children, use a spacer[1] to ease administration (use face mask in children under 3 years). Single puffs should be given one at a time, let the child breathe 4 to 5 times from the spacer before repeating the procedure.
  • **prednisolone** PO: one dose of 1 to 2 mg/kg

– If the attack is completely resolved: observe the patient for 1 hour (4 hours if he lives far from the health centre) then give outpatient treatment: salbutamol for 24 to 48 hours (2 to 4 puffs every 4 to 6 hours depending on clinical evolution) and prednisolone PO (1 to 2 mg/kg once daily) to complete 3 days of treatment.

– If the attack is only partially resolved: continue with 2 to 4 puffs of salbutamol every 3 to 4 hours if the attack is mild; 6 puffs every 1 to 2 hours if the attack is moderate, until symptoms subside, then when the attack is completely resolved, proceed as above.

– If symptoms worsen or do not improve, treat as *severe attack*.

Severe attack

– Hospitalise the patient; place him in a 1/2 sitting position.

– Administer:
  • **oxygen** continuously, at least 5 litres/minute or maintain the O_2 saturation between 94 and 98%.
  • **salbutamol** (aerosol): 2 to 4 puffs every 20 to 30 minutes, up to 10 puffs if necessary in children under 5 years, up to 20 puffs in children over 5 years and adults. Use a spacer to increase effectiveness, irrespective of age.
    or salbutamol (solution for nebulisation), see following page.
  • **prednisolone** PO: one dose of 1 to 2 mg/kg

  In the case of vomiting, use **hydrocortisone** IV every 6 hours (children: 5 mg/kg/injection, adults: 100 mg/injection) until the patient can tolerate oral prednisolone.

– If the attack is completely resolved, observe the patient for at least 4 hours. Continue the treatment with salbutamol for 24 to 48 hours (2 to 4 puffs every 4 hours) and prednisolone PO (1 to 2 mg/kg once daily) to complete 3 days of treatment.
  Reassess after 10 days: consider long-term treatment if the asthma attacks have been occurring for several months. If the patient is already receiving long-term treatment, reassess the severity of the asthma (see table, page 78) and review compliance and correct use of medication and adjust treatment if necessary.

– If symptoms worsen or do not improve, see *life-threatening attack*.

---

[1] If a conventional spacer is not available, use a 500 ml plastic bottle: insert the mouthpiece of the inhaler into a hole made in the bottom of the bottle (the seal should be as tight as possible). The child breathes from the mouth of the bottle in the same way as he would with a spacer. The use of a plastic cup instead of a spacer is not recommended (ineffective).

Life-threatening attack (intensive care)

– Insert an IV line.

– Administer:
  • **oxygen** continuously, at least 5 litres/minute or maintain the O_2 saturation between 94 and 98%.
  • **salbutamol** (solution for nebulisation):
    Children under 5 years or 15 kg: 2.5 mg/nebulisation, to be repeated every 20 to 30 minutes if necessary until clinical improvement is achieved; switch to salbutamol aerosol (using a spacer) as soon as possible.
    Children over 5 years and adults: 2.5 to 5 mg/nebulisation, to be repeated every 20 to 30 minutes if necessary until clinical improvement is achieved; switch to salbutamol aerosol as soon as possible.
    Salbutamol must be administered via an oxygen-driven nebuliser.
  • **hydrocortisone** IV every 6 hours (children: 5 mg/kg/injection, adults: 100 mg/injection).

– For patients who do not respond rapidly to nebulised salbutamol:
  • In adults, administer a single dose of magnesium sulfate (infusion of 1 to 2 g in 0.9% sodium chloride over 20 minutes).
  • In children, use continuous nebulisation rather than intermittent nebulisation.

Notes:
– In pregnant women, treatment is the same as for adults. In mild or moderate asthma attacks, administering oxygen reduces the risk of foetal hypoxia.
– For all patients, irrespective of the severity of the asthma attack, look for underlying lung infection and treat accordingly.

Chronic asthma

Clinical features

– Asthma should be suspected in patients with episodic respiratory symptoms (wheezing, chest tightness, shortness of breath and/or cough) of variable frequency, severity and duration, disturbing sleep, and causing the patient to sit up to breathe. These symptoms may appear during or after exercise.

– Chest auscultation may be normal or demonstrate diffuse sibilant wheezes.

– Atopic disorders or a personal or family history of atopy (eczema, allergic rhinitis/conjunctivitis) or a family history of asthma increases probability of asthma but their absence does not exclude asthma.

Patients with typical symptoms of asthma and a history of disease that is characteristic of asthma should be considered as having asthma after exclusion of other diagnoses.

The assessment of the frequency of daytime and nigthtime symptoms and limitations of physical activity determines whether asthma is *intermittent* or *persistent*.

Treatment

Only patients with persistent asthma need long-term treatment. The mainstay of treatment is inhaled corticosteroids. Treatment is started at the step most appropriate to initial severity then, re-evaluated and adjusted according to clinical response. It aims to abolish symptoms with the lowest possible dose of inhaled corticosteroids. An intervening severe exacerbation or loss of control necessitates reassessment to re-evaluate treatment.

Long-term treatment does not mean treatment for life. Asthma attacks may occur over months or years, with intervening asymptomatic intervals when long-term treatment is not required.

Long-term treatment of asthma according to severity

Categories	Treatment
Intermittent asthma – Intermittent symptoms (< once/week) – Night time symptoms < twice/month – Normal physical activity	No long term treatment Inhaled **salbutamol** when symptomatic
Mild persistent asthma – Symptoms > once/week, but < once/day – Night time symptoms > twice/month – Symptoms may affect activity	Continuous treatment with inhaled **beclometasone** + Inhaled **salbutamol** when symptomatic
Moderate persistent asthma – Daily symptoms – Symptoms affect activity – Night time symptoms > once/week – Daily use of salbutamol	Continuous treatment with inhaled **beclometasone** + Inhaled **salbutamol** (1 puff 4 times/day)
Severe persistent asthma – Daily symptoms – Frequent night time symptoms – Physical activity limited by symptoms	Continuous treatment with inhaled **beclometasone** + Inhaled **salbutamol** (1-2 puff/s 4 to 6 times/day)

Inhaled corticosteroid treatment: **beclometasone** dose varies according to the severity of asthma. Find the minimum dose necessary to both control the symptoms and avoid local and systemic adverse effects:
Children: 50 to 100 micrograms twice daily depending on the severity. Increase to 200 micrograms twice daily if the symptoms are not controlled. In patients with severe chronic asthma the dosage may be as high as 800 micrograms/day.
Adults: start with 250 to 500 micrograms twice daily depending on to the severity. If a total dosage of 1000 micrograms/day (in 2 to 4 divided doses) is ineffective, the dosage may be increased to 1500 micrograms/day, but the benefits are limited.

⚠ The number of puffs of beclometasone depends on its concentration in the inhaled aerosol: 50, 100 or 250 micrograms/puff. To avoid dosing errors, use only inhalers of 50 or 100 micrograms/puff for children. Reserve inhalers of 250 micrograms/puff for adults.

Do not restrict exercise. If exercise is a trigger for asthma attacks, administer 1 or 2 puffs of salbutamol 10 minutes beforehand.

In pregnant women, poorly controlled asthma increases the risk of pre-eclampsia, eclampsia, haemorrhage, in utero growth retardation, premature delivery, neonatal hypoxia and perinatal mortality. Long-term treatment remains inhaled salbutamol and beclometasone at the usual dosage for adults. Whenever possible, avoid oral corticosteroids.

If symptoms are not well controlled during a period of at least 3 months, check the inhalation technique and adherence before changing to a stronger treatment.

If symptoms are well controlled for a period of at least 3 months (the patient is asymptomatic or the asthma has become *intermittent*): try a step-wise reduction in medication, finally discontinuing treatment, if it seems possible. Provide patients with a salbutamol inhaler for any possible attacks. Evaluate after 2 weeks. If the results are satisfactory, continue for 3 months and then re-evaluate. If the patient has redeveloped chronic asthma, restart long-term treatment, adjusting doses, as required.

Pulmonary tuberculosis

Pulmonary tuberculosis is a bacterial infection due to *Mycobacterium tuberculosis*, spread by airborne route. After contamination, *M. tuberculosis* multiplies slowly in the lungs: this represents the primary infection.
In immunocompetent patients, the pulmonary lesion heals in 90% of cases, but in 10%, patients develop active tuberculosis.
Tuberculosis may also be extrapulmonary: tuberculous meningitis, disseminated tuberculosis, lymph node tuberculosis, spinal tuberculosis, etc.

Patients with HIV infection have an increased risk of developing active tuberculosis. Tuberculosis is the opportunistic disease that most commonly reveals AIDS. In certain countries, up to 70% of patients with tuberculosis are co-infected with HIV.

Clinical features

Prolonged cough (> two weeks), sputum production, chest pain, weight loss, anorexia, fatigue, moderate fever, and night sweats.
The most characteristic sign is haemoptysis (presence of blood in sputum), however it is not always present and haemoptysis is not always due to tuberculosis. If sputum is smear-negative, consider pulmonary distomatosis (page 149), melioidosis (Southeast Asia), profound mycosis or bronchial carcinoma.

In an endemic area, the diagnosis of tuberculosis is to be considered, in practice, for all patients consulting for respiratory symptoms for over two weeks who do not respond to non-specific antibacterial treatment.

Diagnosis

– Sputum smear microscopy; culture
– Chest X-rays are useful for the diagnosis of smear negative tuberculosis and tuberculosis in children.

Treatment

The treatment is a combination of several of the following antituberculous drugs [isoniazid (H), rifampicin (R), pyrazinamide (Z), ethambutol (E), streptomycin (S)]. The regimen is standardised and organized into 2 phases (initial phase and continuation phase).
The treatment of drug-sensitive tuberculosis lasts a minimum of 6 months.

It takes significant investment to cure a TB patient, both from the patient and the medical team. Only uninterrupted treatment for several months may lead to cure and prevent the development of resistance, which complicates later treatment. It is essential that the patient understands the importance of treatment adherence and that he has access to correct case management until treatment is completed.

Prevention

When BCG is correctly carried out, it confers protection that is not insignificant (probably over 50%). It has been proven that BCG protects against severe forms of the disease, in particular tuberculous meningitis and miliary tuberculosis.
BCG vaccination does not diminish transmission of tuberculosis.

For more information on the diagnosis, treatment and prevention of tuberculosis, and on the follow-up of tuberculosis patients, refer to the MSF handbook, *Tuberculosis*.

CHAPTER 3

Gastrointestinal disorders

Acute diarrhoea 83

Shigellosis 86

Amoebiasis 88

Disorders of the stomach and duodenum 89

Stomatitis 92

Acute diarrhoea

– Acute diarrhoea is defined as at least 3 liquid stools per day for less than 2 weeks.

– There are 2 clinical types of acute diarrhoea:
  • **Simple diarrhoea without blood**, caused by viruses in 60% of cases (rotavirus, enterovirus), bacteria (*Vibrio cholerae*, enterotoxigenic *Escherichia coli*, non-typhi *Salmonella*, *Yersinia enterocolitica*) or parasites (*giardiasis*). Diseases, such as malaria or upper and lower respiratory tract infections, can be accompanied by this type of diarrhoea.
  • **Dysentery** or **bloody diarrhoea**, caused by bacteria (*Shigella* in 50% of cases, *Campylobacter jejuni*, enteroinvasive or enterohaemorrhagic *Escherichia coli*, *Salmonella*) or parasites (intestinal amoebiasis).

– Infectious diarrhoeas are transmitted by direct (dirty hands) or indirect (ingestion of contaminated water or food) contact.

– The high mortality rate from diarrhoeal diseases, even benign, is due to acute dehydration and malnutrition. This can be prevented by adequate rehydration and nutrition.

Clinical features

– First assess for signs of dehydration. See *Assessment of diarrhoeal patients for dehydration*, WHO, page 305.
– Then look for other signs:
  • profuse watery diarrhoea (cholera, enterotoxigenic *E. coli*),
  • repeated vomiting (cholera),
  • fever (salmonella, viral diarrhoea),
  • presence of red blood in stools: see *Shigellosis*, page 86 and *Amoebiasis*, page 88.
– In a patient over 5 years with severe and rapid onset of dehydration, suspect cholera.

Treatment

General principles:
– Prevent or treat dehydration: rehydration consists of prompt replacement of fluid and electrolyte losses as required, until the diarrhoea stops.
– Administer zinc sulfate to children under 5 years.
– Prevent malnutrition.
– Do not systematically administer antimicrobials: only certain diarrhoeas require antibiotics (see *antimicrobial treatment*, following page).
– Do not administer anti-diarrhoeal drugs or antiemetics.

Prevention of dehydration (outpatient)

Follow *Treatment plan A to treat diarrhoea at home*, WHO, page 306.

Treatment of dehydration

Moderate dehydration (at dispensary level)
Follow *Treatment plan B to treat dehydration*, WHO, page 308.

Severe dehydration (at hospital level)
Follow *Treatment plan C to treat severe dehydration quickly*, WHO, page 311.
- In the event of **hypovolaemic shock** or if there is no improvement after one hour: increase the infusion rate.
- Check for signs of fluid overload: palpebral oedema is the first sign of overhydration. Stop rehydration until oedema disappear.
- If there are signs of acute pulmonary oedema (laryngeal crackles, dyspnoea and increased respiration rate, coughing with or without frothy sputum, distress, bilateral lung crepitations, tachycardia etc.), administer IV **furosemide** immediately and repeat after one to 2 hours if required:
  Children: 1 mg/kg/injection
  Adults: 40 mg/injection

Special situations

- Cholera
  An adult may require up to 10 to 15 litres of **Ringer Lactate** on the first day.
  After 24 hours infusion, particularly if the patient does not start to eat again, there is a risk of hypokalaemia. This can be compensated for by adding 1 to 2 g of **potassium chloride**/litre of Ringer Lactate (1 to 2 ampoules of 10 ml 10% KCl). It is essential to carry out a clinical examination beforehand, and the administration must be monitored carefully (an over-rapid infusion of KCl can be fatal).
- Rehydration and severe malnutrition
  The principle is the same, but the oral rehydration salts used and the volume of fluids required differ from those used for healthy children (see *Severe acute malnutrition*, page 40).

Zinc supplementation (in children under 5 years)

Zinc sulfate is given in combination with oral rehydration solution in order to reduce the duration and severity of diarrhoea, as well as to prevent further occurrences in the 2 to 3 months after treatment:
zinc sulfate PO
Children under 6 months: 10 mg once daily (1/2 tablet once daily) for 10 days
Children from 6 months to 5 years: 20 mg once daily (1 tablet once daily) for 10 days
Place the half-tablet or full tablet in a teaspoon, add a bit of water to dissolve it, and give the entire spoonful to the child.

Prevention of malnutrition

Follow *Treatment plan A to treat diarrhoea at home*, WHO, page 306.

Antimicrobial treatment

Diarrhoea without blood

Most acute diarrhoeas are caused by viruses unresponsive to antimicrobials. Antimicrobials can be beneficial in the event of cholera or giardiasis.

– **Cholera**: the most important part of treatment is rehydration. In the absence of resistance, antibiotic treatment may shorten the duration of illness.
doxycycline PO
Children: 100 mg as a single dose
Adults: 300 mg as a single dose
Note: doxycycline is usually contraindicated in pregnant women and children under 8 years. However, for treating (but not preventing) cholera, the administration of a single dose should not provoke any adverse effects. Check national recommendations.

– **Giardiasis**: tinidazole or metronidazole, see page 147.

Bloody diarrhoea (dysentery)

– **Shigellosis** is the most frequent cause of dysentery (amoebic dysentery is much less common). If there is no laboratory diagnosis to confirm the presence of amoebae, first line treatment is for shigellosis (see page 86).

– **Amoebiasis:** antiparasitic treatment only if motile *E. histolytica* amoebae are found in stools or if a correct shigellosis treatment has been ineffective (see page 88).

Prevention

– Breastfeeding reduces infant morbidity and mortality from diarrhoea and the severity of diarrhoea episodes.

– When the child is weaned preparation and storage of food are associated with the risk of contamination by faecal micro-organisms: discourage bottle-feeding; food must be cooked well; milk or porridge must never be stored at room temperature.

– Access to sufficient amounts of clean water and personal hygiene (washing hands with soap and water before food preparation and before eating, after defecation etc.) are effective methods of reducing the spread of diarrhoea.

Shigellosis

– There are 4 serogroups of shigella: *S. flexneri*, *S. boydii*, *S. sonnei* and *S. dysenteriae*. *Shigella dysenteriae* type 1 (Sd1) is the only strain that causes large scale epidemics. Of the 4 serogroups it has the highest case fatality rate (up to 10%).

– Ciprofloxacin is currently the only effective treatment for shigellosis. It is therefore essential to prevent the development of resistances.

Clinical features

Bloody diarrhoea with or without fever, abdominal pain and tenesmus, which is often intense.

Patients with at least one of the following criteria have an increased risk of death:

– Signs of serious illness:
  • fever > 38.5°C
  • malnutrition (< 80% of the median)
  • severe dehydration
  • confusion, seizures or coma

– Age groups at risk:
  • children under 5 years
  • adults over 50 years

Treatment

– Antibiotic treatment:
  • **ciprofloxacin** PO is the first line treatment
  Children: 30 mg/kg/day in 2 divided doses for 3 days
  Adults: 1 g/day in 2 divided doses for 3 days
  • in pregnant women, ciprofloxacin is contra-indicated in principle, use **ceftriaxone** IM: 1 g once daily for 3 to 5 days

  Amoxicillin is ineffective in vivo. The use of nalidixic acid favours the development of ciprofloxacin resistance.

– For pain:
  hyoscine butylbromide PO
  Children from 6 to 12 years: 10 mg, to be repeated every 8 hours if necessary
  Adults: 10 to 20 mg, to be repeated every 8 hours if necessary
  All opioid analgesics are contra-indicated as they slow peristalsis.

– Supportive therapy:
  • nutrition: all patients with dysentery should receive nutritional supplements
  2500 kcal/day during hospitalisation
  1000 kcal/day as outpatients
  Children already in nutritional centres should be isolated.
  • rehydration: systematic administration of **ORS** (follow the WHO protocols, pages 306 to 311).

– Never give loperamide or any other antidiarrhoeal.
– Complications of shigellosis due to Sd1:
  • septicaemia: see *antibiotic treatment of septic shock* (page 20)
  • acute abdomen: see *antibiotic treatment of septic shock* (page 20) and laparotomy
  • seizures: **diazepam** (page 23) and fluid restriction
  • moderate to severe haemolytic uraemic syndrome, may require transfusion and/or haemodialysis.

Shigellosis in an epidemic context (Sd1)

– Antibiotic resistance develops rapidly (sometimes during the course of an epidemic). After confirming the causal agent, antimicrobial susceptibility should be monitored monthly by culture and sensitivity tests.
– Patients presenting with signs of serious illness or with risk factors are hospitalised for the duration of treatment and are monitored daily (clinically and for compliance).
– Patients with neither signs of serious illness nor risk factors are treated as outpatients. Organise home visits for daily monitoring (clinically and for compliance); hospitalise if the patient develops signs of serious illness.
– Hygiene measures: isolate patients as for cholera, individual and collective hygiene. Shigellosis is an extremely contagious disease (the ingestion of 10 bacteria is infective).

Note: over the past few years, Sd1 epidemics of smaller scale and with lower case fatality rates (less than 1%) have been observed.

Amoebiasis

Amoebiasis is a parasitic infection due to the intestinal protozoa *Entamoeba histolytica*. Transmission is faecal-oral, by ingestion of amoebic cysts from food or water contaminated with faeces. Usually, ingested cysts release non-pathogenic amoebae and 90% of carriers are asymptomatic.
In 10% of infected patients, pathogenic amoebae penetrate the mucous of the colon: this is the intestinal amoebiasis (amoebic dysentery). The clinical picture is similar to that of shigellosis, which is the principal cause of dysentery.
Occasionally, the pathogenic amoebae migrate via the blood stream and form peripheral abscesses. Amoebic liver abscess is the most common form of extra-intestinal amoebiasis.

Clinical features

– **Amoebic dysentery**
  • diarrhoea containing red blood and mucus
  • abdominal pain, tenesmus
  • no fever or moderate fever
  • possibly signs of dehydration

– **Amoebic liver abscess**
  • painful hepatomegaly; mild jaundice may be present
  • anorexia, weight loss, nausea, vomiting
  • intermittent fever, sweating, chills; change in overall condition

Laboratory

– Amoebic dysentery: identification of mobile trophozoites (*E. histolytica histolytica*) in fresh stool samples
– Amoebic liver abscess: indirect haemoagglutination and ELISA

Treatment

– **Amoebic dysentery**
  • The presence of cysts alone should not lead to the treatment of amoebiasis.
  • Amoebiasis confirmed with a parasitological stool examination:
    tinidazole PO
    Children: 50 mg/kg once daily for 3 days (without exceeding 2 g/day)
    Adults: 2 g once daily for 3 days
    or **metronidazole** PO
    Children: 45 mg/kg/day in 3 divided doses for 5 days
    Adults: 1.5 g/day in 3 divided doses for 5 days
  • If there is no laboratory, first line treatment for dysentery is for shigellosis (see page 86). Treat for amoebiasis if correct treatment for shigellosis has been ineffective.
  • Oral rehydration salts (**ORS**) if there is risk of, or if there are signs of dehydration (follow the WHO protocols, pages 306 to 311).

– **Amoebic liver abscess**
  tinidazole PO: same treatment as for amoebic dysentery for 5 days
  metronidazole PO: same treatment as for dysentery for 5 to 10 days

Disorders of the stomach and duodenum

Gastro-oesophageal reflux disease

Clinical features

Burning stomachache or heartburn, generally relieved by antacids; acid regurgitation (often postural: while sitting forward or lying down). In the absence of dysphagia (oesophageal stenosis), these signs are benign.

Treatment

– First instance, encourage the patient to avoid alcohol and tobacco use.
Give **aluminium hydroxide** PO[1]: 1.5 to 3 g/day in 3 divided doses one hour after meals
or
Instruct the patient to take 500 mg at the time of a painful attack.
– If antacids are insufficient:
omeprazole PO: 20 mg once daily in the morning for 3 days
or, if not available, **cimetidine** PO: 400 mg once daily at bedtime for 3 days
– In small children: no drug treatment, rest and sleep on an incline (30° to 45°).

Peptic ulcer diseases

Clinical features

Burning epigastric pain or epigastric cramps between meals, that wake the patient at night. They are most characteristic when they occur as episodes of a few days and when accompanied by nausea and even vomiting.
The most common complications are perforation and bleeding.

Treatment of non-complicated ulcers

– For an isolated episode:
  • identify patients taking NSAID or acetylsalicylic acid; stop treatment
  • encourage patients to avoid alcohol and tobacco use
  • **omeprazole** PO: 20 mg once daily in the morning for 7 to 10 days
  or, if not available, **cimetidine** PO: 800 mg once daily at bedtime for 7 to 10 days
– If the patient has frequent recurrences, unrelated to NSAID use, that require repeated treatment with antiulcer drugs: see eradication of *Helicobacter pylori*, next page.

[1] Aluminium hydroxide may decrease absorption of drugs taken at the same time, leave an interval of at least 2 hours between taking aluminium hydroxide and other drugs.

Treatment of complicated ulcers

Perforation

Perforation should be considered in patients presenting with sudden onset intense epigastric pain, particularly if there is rigidity of the abdominal wall. The risk of peritonitis is increased if the perforation occurs on a full stomach.

– To start:
  - place the patient on a strict fast (NPO); insert a nasogastric tube and aspirate if possible
  - place an intravenous line and hydrate (alternate between 5% glucose and Ringer Lactate)
  - **hyoscine butylbromide** IV or IM: 10 to 20 mg, to be repeated every 8 hours if necessary
  - **omeprazole** IV infusion: 40 mg/day over 20 to 30 minutes
    or, if not available, **cimetidine** continuous IV infusion: 1600 mg over 24 hours
– Refer to a surgeon if the patient has eaten during the 6 hours prior to the onset of pain or if there is no improvement within 12 hours despite medical treatment.
– Continue treatment for 3 days then restart oral feeding if the perforation occurred on an empty stomach and if the patient improved during the first 12 hours of treatment. Then start PO treatment to eradicate *Helicobacter pylori* (see further).

Gastrointestinal bleeding

Passing of black stool (maelena) and/or vomiting blood (haematemesis). In 80% of cases the bleeding stops spontaneously.

– Insert a nasogastric tube for aspiration and insert an IV line (16G).

If the haemodynamic state is stable (pulse and blood pressure are normal)
– Hydrate (Ringer Lactate), monitor, keep NPO for 12 hours.
– If there is no active haemorrhage, restart oral feeding after 12 hours.
– Gastric lavage with cold water is not essential, but may help evaluate persistence of bleeding.

If the haemorrhage continues (haematemesis) ***and/or if the haemodynamic state deteriorates*** (pulse increases, BP drops):
– Intensive care and transfusion according to the severity of the bleeding (see *Haemorrhagic shock*, page 19).
– Emergency surgical intervention.

Most peptic ulcers are caused by *Helicobacter pylori* infection. If a diagnosis of ulcer is probable, and the patient has frequent attacks requiring repeated treatment with antiulcer drugs or, in cases of complicated ulcers (perforation or gastrointestinal bleeding) treatment to eradicate *H. pylori* should be considered to prevent relapses.

Once the acute phase has passed, prescribe one of the following treatments:

Treatment of choice (10 days)		Alternative (14 days)
metronidazole PO [2] 1 g/day in 2 divided doses + **amoxicillin** PO 2 g/day in 2 divided doses + **omeprazole** PO 40 mg/day in 2 divided doses	**metronidazole** PO [2] 1 g/day in 2 divided doses + **amoxicillin** PO 2 g/day in 2 divided doses + **bismuth subcitrate** PO 480 mg/day in 4 divided doses	**metronidazole** PO [2] 1 g/day in 2 divided doses + **amoxicillin** PO 2 g/day in 2 divided doses + **cimetidine** PO 1600 mg/day in 2 divided doses

[2] Metronidazole PO can be replaced with tinidazole PO: 1 g/day in 2 divided doses.

Notes:
– Acetylsalicylic acid (aspirin) and NSAID (indometacin, ibuprofen, diclofenac etc) are contra-indicated in patients suffering from or with a history of ulcers.
– Omeprazole is as effective PO as IV.

Dyspepsia

Clinical features

Epigastric pain or discomfort following meals, often accompanied by bloating, sensation of fullness and nausea. Dyspepsia is most commonly functional, linked with stress and not linked to the quantity of gastric acid (antiacids and antiulcer drugs are ineffective). Resolution is usually spontaneous.

Treatment

If the symptoms persist, short term symptomatic treatment may be considered:
metoclopramide PO in 2 or 3 divided doses 1/2 hour before meals for 2 to 3 days may be helpful particularly in cases of nausea, vomiting, bloating etc.
Children over 20 kg: 0.4 mg/kg/day
Adults: 15 to 30 mg/day

In adults, **hyoscine butylbromide** PO: 30 mg/day in 3 divided doses, 1/2 hour before meals for 2 to 3 days may be helpful, particularly in cases of spasmodic pain.

Note: consider and treat possible intestinal parasites (taeniasis, ascariasis, ancylostomiasis, giardiasis, amoebiasis).

Stomatitis

Stomatitis is an inflammation of the mucous membranes of the mouth caused by a fungal, viral or bacterial infection, a vitamin deficiency, an injury, etc.
Stomatitis is painful, making eating uncomfortable. Prolonged stomatitis may contribute to dehydration or may cause loss of appetite with denutrition, particularly in children. In infants, examine routinely the mouth in case of breast refusal or difficulties in sucking.

In all cases:
– Maintain adequate hydration and feeding; offer foods that will not irritate the mucosa (soft, non-acidic). Use a nasogastric tube (for approximately 3 days) only if pain is preventing the patient from eating.
– Keep the mouth clean to prevent complications and recurrence.
– Show the mother how to treat since in most cases, stomatitis will be treated at home.

Oral and oropharyngeal candidiasis

Infection due to *Candida albicans*, common in infants and immunocompromised patients (e.g. malnutrition, people with HIV infection). Other risk factors include treatment with oral antibiotics or high-dose inhaled corticosteroids; diabetes.

Clinical features

Bright red mucosa and white patches on the tongue, inside the cheeks, that may spread to the whole mouth and sometimes the pharynx.
In patients with frequent recurrences or extensive forms (oesophageal candidiasis), consider HIV infection.

Treatment

Local antifungal treatment is to be taken between meals:

– **nystatin**: 400 000 IU/day (i.e. 1 lozenge of 100 000 IU to be sucked or 1 ml of the oral suspension) 4 times/day, for 7 days. The oral suspension should be swilled around the oral cavity and swallowed, or, in young children, applied to the tongue and the inside of each cheek.
– In immunocompromised patients: use miconazole (mucoadhesive tab). If the infection has spread to the oesophagus, topical therapy is ineffective, use fluconazole PO. See page 214.

Oral herpes

Clinical features

– Primary infection: infection due to the herpes simplex virus, very common in children. Very painful lesions, in the form of vesicles, erosions or yellowish ulcerations on the lips and buccal mucosa with general malaise, peripheral lymph swelling and fever.
– Recurrence: clusters of vesicles in the nasolabial area (see *Herpes simplex*, page 116).

Both forms of herpes are contagious.

Recurrences may be provoked by an infectious disease such as malaria or pneumonia.

In patients with frequent recurrences or extensive forms, consider HIV infection.

Treatment

– Clean the affected area with a solution of **sodium bicarbonate** + **polyvidone iodine** 4 times/day (preparation: 1/2 teaspoon sodium bicarbonate + 1 teaspoon 10% polyvidone iodine in 250 ml of water).
– Treat pain (paracetamol PO).
– Spontaneous resolution usually occurs within 7 to 10 days. Secondary infections may develop.
– In immunocompromised patients, see page 214.

Other infectious causes

Tonsillitis (page 53), diphtheria (page 55), measles (page 189).

For scarlet fever (strawberry tongue associated with a skin rash):
phenoxymethylpenicillin (**penicillin V**) PO for 10 days
Children under 1 year: 250 mg/day in 2 divided doses
Children from 1 to 5 years: 500 mg/day in 2 divided doses
Children from 6 to 12 years: 1 g/day in 2 divided doses
Adults: 2 g/day in 2 divided doses

Stomatitis from scurvy (vitamin C deficiency)

Clinical features

Bleeding gums, associated in infants with lower limb pain caused by subperiosteal haemorrhage. It is common in contexts of poor food quality or in populations completely dependent on food aid (refugee camps).

Treatment

– Clean the mouth with a solution of **sodium bicarbonate**, as above.

– **ascorbic acid** (**vitamin C**) PO
Children: 150 to 200 mg/day in 3 or 4 divided doses
Adults: 500 to 750 mg/day in 3 or 4 divided doses
The treatment is continued until symptoms improve (1 to 2 weeks), then a preventive treatment (children and adults: 25 to 50 mg/day) is given as long as the situation requires.

Other lesions resulting from a nutritional deficiency

Other vitamin deficiencies may provoke mouth lesions: angular stomatitis of the lips and glossitis from vitamin B2 (riboflavin), niacin (see *Pellagra*, page 118) or vitamin B6 (pyridoxine) deficiencies. Iron deficiency may also provoke angular stomatitis. Give the corresponding vitamins at curative doses. Multivitamins are insufficient to treat true vitamin deficiencies.

CHAPTER 4

Skin diseases

Dermatology 97

Scabies 98

Lice (pediculosis) 101

Superficial fungal infections 103

Bacterial skin infections 105

Cutaneous anthrax 109

Treponematoses 111

Leprosy 113

Herpes simplex and herpes zoster 116

Other skin disorders 117

Dermatology

Skin diseases, particularly infectious skin diseases, are very common. They must be treated individually or collectively, but must also be considered as indicators of the sanitary condition of a population. A high prevalence of infectious skin diseases may reflect a problem of insufficient water quantity and lack of hygiene in a population.

Dermatological examination

– Observe the type of lesion:
  - **Macule**: flat, non palpable lesion that is different in colour than the surrounding skin
  - **Papule**: small (< 1 cm) slightly elevated, circumscribed, solid lesion
  - **Vesicle** (< 1 cm), **bulla** (> 1 cm): clear fluid-filled blisters
  - **Pustule**: vesicle containing pus
  - **Nodule**: firm, elevated palpable lesion (> 1 cm) that extend into the dermis or subcutaneous tissue.
  - **Erosion**: loss of the epidermis that heals without leaving a scar
  - **Excoriation**: erosion caused by scratching
  - **Ulcer**: loss of the epidermis and at least part of the dermis that leaves a scar
  - **Scale**: flake of epidermis that detaches from the skin surface
  - **Crust**: dried serum, blood, or pus on the skin surface
  - **Atrophy**: thinning of the skin
  - **Lichenification**: thickening of the skin with accentuation of normal skin markings
– Look at the distribution of the lesions over the body; observe their arrangement: isolated, clustered, linear, annular (in a ring). Ask if the lesions are itchy.
– Look for a possible cause: insect bites; scabies, lice, other parasitic skin infections; contact with plants, animals, jewellery, detergents, etc.
– Ask about any ongoing treatment: topical, oral or parenteral.
– Look for local or regional signs (secondary infection, lymphangitis, adenopathy, erysipelas) and/or systemic signs (fever, septicaemia, distant infectious focus).
– Consider the sanitary condition of the family, particularly for contagious skin diseases (scabies, scalp ringworm, lice).
– Check tetanus vaccination status.

Patients with skin disease often present late. At this stage, primary lesions and specific signs may be masked by secondary infection. In these cases, it is necessary to re-examine the patient, after treating the secondary infection, in order to identify and treat the underlying skin disease.

Scabies

Scabies is a cutaneous parasitosis due to the presence of the mite *Sarcoptes scabiei hominis* within the epidermis. It exists in two forms: ordinary scabies, relatively benign and moderately contagious; and crusted scabies, favoured by immune deficiency, extremely contagious and refractory to conventional treatment. Person to person transmission takes place chiefly through direct skin contact, and sometimes by indirect contact (sharing clothing, bedding). The challenge in management is that it must include simultaneous treatment of both the patient and close contacts, and at the same time, decontamination of clothing and bedding of all persons undergoing treatment, in order to break the transmission cycle.

Clinical features

Ordinary scabies

In older children and adults

– Itching, worse at night, very suggestive of scabies if close contacts have the same symptom

and

– Typical skin lesions:
  • Scabies burrows (common): fine wavy lines of 5 to 15 mm, corresponding to the tunnels made by the parasite within the skin. Burrows are most often seen in the interdigital spaces of the hand and flexor aspect of the wrist, but may be present on the areolae, buttocks, elbows, axillae. The back and the face are spared. Burrows may be associated with vesicles, corresponding to the entry point of the parasite in the skin.
  • Scabies nodules (less common): reddish-brown nodules, measuring 2 to 20 mm, on the genitals in men, persisting after effective treatment (they are not necessarily indicative of active infection).

and/or

– Secondary skin lesions: resulting from scratching (excoriations, crusts) or super-infection (impetigo).

Typical lesions and secondary lesions may co-exist, or specific lesions may be entirely masked by secondary lesions.

In infants and young children

– Vesicular eruption; often involving palms and soles, back, face, and limbs. Secondary infection or eczematisation is frequent. Isolated scabies nodules in the axillae may be the only manifestation.
– Examination of the mother's hands may support the diagnosis.

Crusted (Norwegian) scabies

Thick, scaly, erythematous plaques, generalised or localised, resembling psoriasis, with or without itching (50% of cases). Delay in diagnosis may lead to a scabies epidemic.

Treatment

In all cases

– Close contacts of the patient are treated simultaneously, even in the absence of symptoms.
– Clothing and bedding (including that of contacts) are changed after each treatment. They are washed at ≥ 60°C then dried in the sun, or exposed to sunlight for 72 hours, or sealed in a plastic bag for 72 hours.

Ordinary scabies

Topical treatment

Topical scabicides are applied over the entire body (including the scalp, post-auricular areas, umbilicus, palms and soles), avoiding mucous membranes and face, and the breasts in breastfeeding women. Particular attention should be paid to common infestation sites. The recommended contact time should not be shortened or exceeded; the patient must not wash his hands while the product is in use (or the product should be reapplied if the hands are washed). In infants, the hands must be wrapped to prevent accidental ingestion of the product. Topical scabicides should not be applied to broken or inflamed skin. Treatment of secondary bacterial infection, if present, should be initiated 24 to 48 hours before use of topical scabicides (see *Impetigo*, page 105).

The preferred treatment is **5% permethrin** (lotion or cream):
Child > 2 months and adult: one application, with a contact time of 8 hours, then rinse off. Permethrin is easier to use (no dilution required), and preferred over benzyl benzoate in children, and pregnant/lactating women. One application may be sufficient, but a second application 7 days later reduces the risk of treatment failure.

or, if not available, **benzyl benzoate 25%** lotion:

	Child < 2 years	**Child 2-12 years**	**Child > 12 years and adult**
Dilution	Lotion must be diluted before use:		Use undiluted 25% lotion
	1 part 25% lotion + 3 parts water	1 part 25% lotion + 1 part water	
Contact time	12 hours (6 hours for infants < 6 months), then rinse off	24 hours, then rinse off	24 hours, then rinse off

A second application of benzyl benzoate (e.g. after 24 hours, with a rinse between the 2 applications; or two successive applications, 10 minutes apart, when the first application has dried, with a rinse after 24 hours) reduces the risk of treatment failure.
Second applications are not recommended in pregnant women and children < 2 years.

Oral treatment

Treatment with **ivermectin** PO (200 micrograms as a single dose) is an alternative: it is more practical than topical treatment (e.g. in the case of an epidemic or for treating contacts) and can be started right away in the case of secondary infection. A single dose may be sufficient; a second dose 7 days later reduces the risk of treatment failure.

Ivermectin is not recommended for children < 15 kg or pregnant women (safety not established)[1].
Administration of ivermectin to patients with loiasis carries a risk of severe neurological complications when significant *Loa loa* microfilaraemia is present (see *Filariasis*, page 157)[2].

Weight	**15 to 24 kg**	**25 to 35 kg**	**36 to 50 kg**	**51 to 65 kg**
Ivermectin 3 mg tab	1 tab	2 tab	3 tab	4 tab
Ivermectin 6 mg tab	1/2 tab	1 tab	11/2 tab	2 tab

Treatment effectiveness is judged on clinical grounds. Itching may persist for 1 to 3 weeks after elimination of the parasite.
Persistence of typical burrows beyond 3 weeks should lead to suspicion of treatment failure (insufficient treatment, e.g. the scalp was not included in topical treatment or the patient washed his hands during the treatment period), or early re-infestation (contacts and environment not treated). In these cases, patient and contacts should be retreated.
Persistent itching may be due to another condition, initially masked by scabies.

Crusted scabies

Treatment combines simultaneous administration of oral ivermectin and topical scabicide at regular intervals, e.g. every week for 2 to 3 weeks or more, according to severity and clinical response.
Crusts should be softened (salicylic acid ointment) and removed before applying local treatment (otherwise, local treatment is ineffective).
As exfoliated skin scales may spread the parasite, the patient should be isolated during the treatment, staff should use protection (gloves, gowns and hand washing after contact), and environment (bedding, floors and surfaces) should be decontaminated.

1 Treatment with ivermectin in these patients is reserved for severe cases for which no alternative exists (see crusted scabies).

2 In areas where loiasis is endemic, certain precautions are recommended before administering ivermectin: e.g. measure the *Loa loa* microfilaraemia, if possible, or ensure that the patient has no history of loiasis (migration of an adult worm under the conjunctiva or transient « Calabar » swellings), nor history of severe adverse reactions following a previous treatment with ivermectin, or if in doubt, use topical treatment in preference to oral.

Lice (pediculosis)

Pediculosis is a benign contagious parasitic infection due to 3 species of lice specific to humans: head lice, body lice and pubic lice. Transmission from person to person occurs through direct or indirect contact.
Body lice are potential vectors of relapsing fever (page 182), typhus (page 185) and trench fever.

Clinical features

- Head lice mainly affect children: itching and scratch marks (nape of neck and around the ears), which may become secondarily infected (impetigo) in prolonged infestation; presence of live lice and/or live (shiny, grey) nits attached to the hair shaft within 5 mm of the scalp.
- Body lice mainly affect populations living under poor conditions (refugees, prisoners, the homeless): itching and scratch marks (back, belt line and armpits), often inflamed and infected; presence of lice and nits in the clothing (parasites are not found on the body).
- Pubic lice are considered to be a sexually transmitted infection (STI): itching and scratch marks (pubic and perianal area), but other hairy areas may also be affected (armpits, thighs, eyelashes); lice and nits at the base of the hair shaft, rarely visible.
- Examine contacts; check for associated systemic infection (body lice) or STI (pubic lice).

Treatment

Head lice

Apply to dry hair **1% permethrin** lotion (leave on for 10 min) or **0.5% malathion** lotion (leave on for 12 hours; 8 hours in children 6 months-2 years). Do not reduce or exceed the recommended duration of treatment. Rinse thoroughly. Decontaminate combs, headwear and bedding (wash ≥ 60°C/30 min, iron or dry in the sun or, if not feasible, seal in a plastic bag for 2 weeks). Treat those contacts with lice and/or live nits, not those with dead nits alone (dull, white, > 1 cm from scalp) as above. It is recommended to repeat the application after 10 days.

Body lice

For *mass treatment* (outbreak): apply 30 to 60 g (2 to 4 heaped soup spoons) of **0.5% permethrin** powder to the inside of the clothes and underclothes in contact with the skin (front and back, neck and waistline, sleeves and socks) in a fully clothed patient, then rub in the powder by hand. Leave for 12 to 24 hours. Treat other clothing (including headwear) and bedding in a plastic bag with **0.5% permethrin** powder. Repeat in 8 to 10 days if the infestation persists.

For *individual treatment*: disinfection of clothing and bedding as above or as for head lice.

Pubic lice

Shave and/or apply **1% permethrin** lotion to hairy areas (as for head lice). Treat the partner at the same time. Decontaminate clothing and bedding (as for head lice). Repeat the application after 7 days.

Treatment of secondary bacterial infection, if present, should begin 24 to 48 hours before local antiparasitic treatment (see *Impetigo*, page 105) ; local treatment is applied later when tolerated.

Superficial fungal infections

Benign fungal infections of the skin, scalp and nails caused by *Candida albicans* and dermatophytes (tinea).

Clinical features and treatment

Candidiasis

– **Diaper dermatitis**: erythema of the perineum with peripheral desquamation and sometimes pustules. Secondary infection may develop.
  • Clean the skin with ordinary soap and water, dry well and apply **gentian violet** 2 times/day for 2 to 3 weeks according to the clinical evolution. Do not use Whitfield's ointment.
  • Avoid humidity: remove plastic pants and diapers, expose the buttocks to air.
  • If diaper dermatitis is severe and persistent despite correct local treatment, treat as an intestinal infection (**nystatin** PO: 400 000 IU/day in 4 divided doses for 20 days).

– **Other candidiases**: of the dermal folds (treat as above), of the mouth (see *Stomatitis*, page 92), of the vagina (see *Abnormal vaginal discharge*, page 233).

Dermatophytoses (ringworm)

– **Scalp ringworm**: mainly in children.
  Depending on the species:
  – one or more round, scaly, erythematous plaques with the ends of broken hairs
  – inflammation, suppuration, crusting and peripheral lymphadenopathy (kerion);
  – permanent hair loss (favus).
  • Shave the hair, clean with soap et water 2 times/day and apply **Whitfield's ointment** 2 times/day for at least 2 weeks and if necessary for the entire duration of treatment with griseofulvin.
  • **griseofulvin** PO
  Children: 10 to 20 mg/kg/day in 1 or 2 divided doses for 6 weeks
  Adults: 500 mg to 1 g maximum/day in 1 or 2 divided doses for 6 weeks
  Treatment may last up to 12 weeks in severe infections.
  • For painful kerion: paracetamol PO.
  • For infected scalp ringworm: treat the secondary infection before applying Whitfield's ointment (see *Impetigo*, page 105).
  • Some scalp ringworms are contagious: simultaneously examine and treat symptomatic contacts.

– **Ringworm of the body** (of glabrous skin): erythematous, scaly, pruritic macule with a well-demarcated, raised, vesicular border and central healing.
  • Clean with soap et water 2 times/day, dry well and apply **Whitfield's ointment** 2 times/day for 3 weeks if the lesions are not very extensive .
  • Keep griseofulvin PO for extensive lesions (at least 4 weeks of treatment).

– **Other dermatophytoses**
  – Ringworm of the foot (athlete's foot): pruritus, fissures and whitish scales in the 3rd and/or 4th interdigital spaces (these differ from *Candida albicans* lesions which are usually in the 1st and 2nd interdigital spaces).
  – Ringworm of the groin: circumscribed, pruritic, erythematous plaque, with a pale centre surrounded by vesiculo-pustules, extending outward from the groin.
  • Clean with soap et water 2 times/day, dry well and apply **Whitfield's ointment** 2 times/day for 3 weeks.
  • If the lesions ooze, apply **gentian violet** 2 times/day before starting treatment with Whitfield's ointment.

Note: fungal infections of the fingernails and toenails due to *Candida albicans* and dermatophytes require 12 to 18 months of oral treatment which, in practice, is difficult.

Bacterial skin infections

Impetigo

– Impetigo is a benign, contagious infection of the epidermis due to group A ß-haemolytic streptococcus and *Staphylococcus aureus*. Co-infection is common. Transmission is by direct contact. Lack of water and poor hygiene increase spread.
– Primary infections are most common in children. Secondary infections complicating pre-existing pruritic dermatoses (lice, scabies, eczema, herpes, chickenpox etc.) are more common in adults.

Clinical features

– Classic form: flaccid vesicule on erythematous skin which becomes pustular and forms a yellowish crust. Different stages of the infection may be present simultaneously. The lesion does not leave a scar. The most common sites of infection are around the nose and mouth, on the limbs or on the scalp. There is no fever.
– Bullous impetigo: large flaccid bullae and erosions of the skin in the ano-genital region in newborns and infants.
– Ecthyma: an ulcerative form of impetigo that leaves scars. Lesions usually occur on the lower limbs. This form is most common in the immunocompromised, diabetics and alcoholics.
– Rare complications:
  • abscess, pyodermitis, lymphangitis, osteomyelitis, septicaemia;
  • systematically look for signs of acute glomerulonephritis.

Treatment

– ***Localised impetigo*** (less than 3 lesions on the same region of the body):
  • Clean with soap and water 2 times/day and dry then, apply 0.5% gentian violet.
  • Soften crusts if present by applying vaseline and gently remove them.
  • Keep dry (do not cover with an occlusive dressing; if on the buttocks of children, leave uncovered, etc.).
  • Keep fingernails short.
– ***Extensive impetigo*** (more than 3 lesions or impetigo on more than one region of the body), bullous impetigo, ecthyma, abscess; immunocompromised patient:
  • Treat locally as above.
  • Incise abscesses.
  • Treat systematically with antibiotics:
    cloxacillin PO
    Children: 50 mg/kg/day in 2 divided doses for 10 days
    Adults: 2 g/day in 2 divided doses for 10 days
    For patients allergic to penicillin: **erythromycin** PO
    Children: 30 to 50 mg/kg/day in 2 or 3 divided doses for 10 days
    Adults: 2 to 3 g/day in 2 or 3 divided doses for 10 days

– ***For all patients*:**
  - Quarantine from school.
  - Treat any pre-existing skin disease: lice (see page 101), scabies (see page 98), eczema (see page 117), herpes (see page 116), scalp ringworm (see page 103), or an ENT infection (see Chapter 2).
  - Trace and treat contacts.
  - Systematically check for proteinuria (use a reagent strip) 3 weeks after the infection.

Furuncles (boils) and carbuncle

A necrotising perifollicular infection, usually due to *Staphylococcus aureus*. Development is favoured by humidity, breaks in the skin, lack of hygiene, diabetes mellitus, malnutrition, iron deficiency or compromised immunity.

Clinical features

– Furuncle: red, warm, painful nodule with a central pustule, usually around a hair follicle. It becomes fluctuant, discharges a core of purulent exudate, and leaves a depressed scar. It occurs most frequently on the thighs, groin, buttocks, armpits, neck and back. There is no fever.

– Carbuncle: a cluster of interconnected furuncles, sometimes with fever and peripheral adenopathies. It leaves a depressed scar.

Treatment

– For a single furuncle:
  Clean with soap and water 2 times/dayand cover with a dry dressing.
  Warm moist compresses encourage furuncle to drain.
  After drainage, clean and apply an antiseptic until the lesion has completely healed.

– For furuncles on the face, carbuncles, multiple furuncles (furunculosis) or in immunocompromised patients, treat systematically with antibiotics:
  cloxacillin PO
  Children: 50 mg/kg/day in 2 divided doses for 8 days
  Adults: 2 g/day in 2 divided doses for 8 days

  For patients allergic to penicillin:
  erythromycin PO
  Children: 30 to 50 mg/kg/day in 2 or 3 divided doses for 8 days
  Adults: 2 to 3 g/day in 2 or 3 divided doses for 8 days

– Excise the furuncle only when it becomes fluctuant.

– For all cases:
  - Daily cleaning, frequent hand washing, wash bedding;
  - Never manipulate a furuncle on the face as there is a risk of serious complication: unilateral facial inflammation with high fever and risk of cavernous sinus thrombosis. In this case treat with:
    cloxacillin slow IV
    Children: 75 mg/kg/day in 3 injections
    Adults: 3 g/day in 3 injections
    Change to oral treatment as soon as possible, at the same doses, to complete 10 days of treatment.

Or, for patients allergic to penicillin: **chloramphenicol** IM
Children over 2 months: 100 mg/kg/day in 3 injections
Adults: 3 g/day in 3 injections
Change to oral treatment as soon as possible, at the same doses, to complete 10 days of treatment.

Erysipela

Erysipela is an acute non-necrotising hypodermal infection, due to group A streptococcus. Common in adults, rare in children.

Clinical features

- Painful, inflammatory, oedematous plaque on a lower limb, high fever, peripheral adenopathies and lymphangitis).
- May occur on the face: bilateral, oedematous plaques, with peripheral swelling.
- Look for a cutaneous portal of entry: ulcer, wound, intertrigo.
- Local complications: most commonly superficial abscess, sometimes deep abscess (secondary staphylococcal infection), rarely develops into necrotising faciitis.
- Rare generalised complications: septicaemia, acute glomerulonephritis, erythema nodosum.

Treatment

- **benzylpenicillin procaine** IM
  Children: 50 000 IU/kg once daily
  Adults: 1.5 MIU once daily
  until the fever disappears and there is clinical improvement, then change to oral treatment to complete 7 to 10 days of treatment with:
  phenoxymethylpenicillin (**penicillin V**) PO
  Children under 1 year: 250 mg/day in 4 divided doses
  Children from 1 to 5 years: 500 mg/day in 4 divided doses
  Children from 6 to 12 years: 1 g/day in 4 divided doses
  Adults: 2 g/day in 4 divided doses
  or
  amoxicillin PO: 50 mg/kg/day in 2 or 3 divided doses
  For patients allergic to penicillin: **erythromycin** PO
  Children: 50 mg/kg/day in 2 or 3 divided doses for 7 to 10 days
  Adults: 3 g/day in 3 divided doses for 7 to 10 days
- Hospitalise patients who show marked generalised signs, signs of local complications, patients in poor general condition (chronic disease, the elderly) or if there is a risk of non-compliance during outpatient treatment.
- *Note*: other bacteria (*Staphylococcus aureus*, Gram negative bacteria) may cause acute cellulitis resembling erysipela. In the event of treatment failure with penicillin, consider these infections and change to **amoxicillin** + **clavulanic acid** (**co-amoxiclav**).

– For all patients:
  • Bed rest with the affected leg elevated.
  • Non-steroidal anti-inflammatory drugs (NSAID) are contra-indicated (risk of necrotising fasciitis).
  • Treat the portal of entry (ulcer, wound, intertrigo).
  • Systematically check for proteinuria, on reagent strip, 3 weeks after the infection.

Necrotising infections of the skin and soft tissue

Necrosis of the hypodermis, with a vascular thrombosis, and sometimes a necrosis of the underlying superficial aponeurosis (fasciitis) and secondarily necrosis of the dermis. The clinical picture varies depending on the causal bacteria, most often Group A streptococcus, commonly associated with other bacteria (*Staphylococcus aureus*, anaerobic, enterobacteria, enterococcus).

Clinical features

Intensely painful, poorly demarcated, erythematous plaque with oedema and severe septic syndrome. Some patients then develop hemorrhagic blisters and bluish or blackish, cold, hypoaesthetic spots. The presence of gas or crepitation on palpation is linked to certain bacteria (*Clostridium perfringens*, enterobacteria).

Treatment

In case of necrotising fasciitis or gas gangrene: refer.

– Urgent surgical drainage of the wound and excision of the necrotic tissue.

– Antibiotic treatment (the length of treatment varies according to the clinical evolution):
  • **Necrotising fasciitis:**
    benzylpenicillin IV
    Children: 600 000 IU (360 mg)/kg/day in 6 injections or infusions given every 4 hours
    Adults: 24 MIU (14.4 g)/day in 6 injections or infusions given every 4 hours
    +
    clindamycin IV
    Children: 40 mg/kg/day in 3 infusions given every 8 hours (maximum 1.3 g/day)
    Adults: 1.8 g/day in 3 infusions given every 8 hours
  • **Gas gangrene:**
    benzylpenicillin IV: as above
    +
    metronidazole IV
    Children: 30 mg/kg/day in 3 infusions given every 8 hours (maximum 1.5 g/day)
    Adults: 1.5 g/day in 3 infusions given every 8 hours
    +
    gentamicin IM
    Children and adults: 3 to 6 mg/kg/day in 2 injections

Cutaneous anthrax

– A toxic infection of herbivores due to *Bacillus anthracis* that is transmitted to humans by inoculation through the skin (contact with infected dead animals, flies). Cutaneous anthrax is common in the tropics.

– Pulmonary (transmitted by inhalation) and intestinal (transmitted by eating infected meat) forms also exist.

Clinical features

– Papule, then pruritic vesicle that ulcerates and becomes a black eschar surrounded by significant oedema with lymphangitis, regional adenopathy and/or generalised signs. Cutaneous anthrax usually occurs on uncovered areas of the body (head, neck, limbs) and is painless.

– If not treated promptly, there is a risk of extensive, malignant oedema and septicaemia.

Treatment

– **Simple cutaneous anthrax** (at dispensary level):

  • Antibiotic treatment:

  phenoxymethylpenicillin (**penicillin V**) PO
  Children under 1 year: 250 mg/day in 4 divided doses for 7 to 10 days
  Children from 1 to 5 years: 500 mg/day in 4 divided doses for 7 to 10 days
  Children from 6 to 12 years: 1 g/day in 4 divided doses for 7 to 10 days
  Adults: 2 g/day in 4 divided doses for 7 to 10 days

  For patients allergic to penicillin:
  doxycycline PO (except for children under 8 years and pregnant or lactating women)
  Children over 8 years and adults: 200 mg/day in 2 divided doses for 7 to 10 days
  or
  erythromycin PO
  Children: 30 to 50 mg/kg/day in 2 or 3 divided doses for 7 to 10 days
  Adults: 2 to 3 g/day in 2 or 3 divided doses for 7 to 10 days

  • Do not excise the eschar. Daily dry dressings.

– **Cutaneous anthrax with extensive oedema or generalised signs or cutaneous anthrax localised on the head or neck** (at hospital level):

  benzylpenicillin procaine + benzylpenicillin or **benzylpenicillin procaine** IM
  Children: 100 000 IU/kg/day in 1 or 2 injections
  Adults: 4 MIU/day in 1 or 2 injections

Change to oral treatment as soon as possible with **phenoxymethylpenicillin** (**penicillin V**) PO to complete 10 days of treatment:
Children under 1 year: 250 mg/day in 4 divided doses
Children from 1 to 5 years: 500 mg/day in 4 divided doses
Children from 6 to 12 years: 1 g/day in 4 divided doses
Adults: 2 g/day in 4 divided doses

For patients allergic to penicillin:
chloramphenicol IV
Children: 100 mg/kg/day in 3 injections
Adults: 3 g/day in 3 injections
Change to oral treatment as soon as possible with **chloramphenicol** PO at the same doses to complete 10 days of treatment.

Prevention

– Antibiotic prophylaxis for adult contacts:
doxycycline PO (except for pregnant and lactating women): 200 mg/day for 6 weeks
– Bury or burn the carcasses of animals that die of anthrax.

Treponematoses

– Bacterial infections caused by 3 different types of treponema (other than *Treponema pallidum*).
– Human-to-human transmission may be direct or indirect.
– The 3 non-venereal treponematoses result in positive syphilis serology (TPHA-VDRL), but this test is not necessary as diagnosis is clinical.
– For treatment of syphilis see *Genital infections*, page 229.

Clinical features

See table following page.

Treatment

– ***For the 3 treponematoses***

benzathine benzylpenicillin IM
Children under 6 years: 600 000 IU as a single injection
Children over 6 years and adults: 1.2 MIU as a single injection

For patients allergic to penicillin:
erythromycin PO
Children: 50 mg/kg/day in 2 or 3 divided doses for 14 days
Adults: 2 to 3 g/day in 2 or 3 divided doses for 14 days
or
doxycycline PO (except for children under 8 years and pregnant and lactating women)
Children over 8 years: 100 to 200 mg once daily or in 2 divided doses for 14 days
Adults: 200 mg once daily or in 2 divided doses for 14 days

Notes:
- Antibiotic treatment will cure early stage cases and may relieve the pain of osteitis. It may be ineffective for late stage infections.
- Syphilis serology will remain positive despite clinical cure.

– ***Prophylactic treatment of contacts***

Examine contacts and treat with **benzathine benzylpenicillin** IM as a single dose as above (also treat patients in the latent stage with positive serology in endemic zones).

Clinical signs of treponematoses

	YAWS	PINTA	BEJEL (endemic syphilis)
Pathogen	*Treponema pertenue*	*Treponema carateum*	*Treponema pallidum* type M
Geographic distribution	Tropical and humid forests	Tropical zones of Latin America	Arid areas, semi-desert of the Middle East and Africa
Population	Children between 4 and 14 years	Children and adults	Nomadic populations, particularly children
First stage	Yaws chancre: skin coloured lesion, non-indurated, itchy, on the lower limbs in 95% of cases, with peripheral adenopathy. Spontaneous healing or development of a large yaw surrounded by smaller yaws.	Annular, erythematous, scaly plaques, usually on uncovered body parts (face, extremities), resemble dermatophytes. Lesions heal spontaneously leaving scars.	Discrete chancre: moist papule, most commonly on the mucous membranes or in dermal folds, with peripheral adenopathy.
Second stage	Lesions appear 3 weeks after the initial chancre, occur in crops and heal spontaneously: – frambesioma (papillomatous lesion, vegetal, very contagious) – isolated or associated with yaws (round, squamous papules, not very contagious) – osteoperiostitis of the long bones (phalanges, nasal process of the maxilla, tibia)	Pintids: plaques of various colours (bluish, reddish, whitish). May occur anywhere on the body.	– mucous patches of the mouth common: very contagious ulcerated, round in form, indurated, with white coating, bleed easily, usually occur on the inside of the lips, cheek and tongue or labial folds – condyloma in the anogenital region (rare) – cutaneous lesions are rare: vegetal aspect, in dermal folds – bone destruction identical to that of yaws, in the legs and forearms
Late stage	After some years of latency: periostitis; painful, debilitating osteitis; ulcerating and disfiguring rhinopharyngitis; juxta-articular nodules	Symmetrical white patches on the limbs. The depigmentation is permanent, remaining after treatment.	After several years of latency: – gummatous lesions of skin and long bones – plantar and palmar keratosis – juxta-articular nodules – hyper- and hypo-pigmented patches (as in pinta)

Leprosy (Hansen's disease)

An endemic, chronic bacterial infection due to *Mycobacterium leprae*. Humans are the only reservoir of proven significance. Leprosy is not very contagious with transmission through prolonged, close, direct contact, particularly between household members. Children are most at risk of contracting the disease.

Clinical features

Leprosy should be considered in any patient presenting with hypopigmented skin lesions or peripheral neuropathy. In suspect cases, conduct a thorough clinical examination:
– skin and mucous membranes (patient must be undressed)
– neurological examination: sensitivity to light touch, pinprick and temperature (hot-cold test)
– palpation of the peripheral nerves

Different clinical forms and classification of leprosy exist.
The Ridley-Jopling classification differentiates 5 forms based on several factors, including the bacteriological index.
The WHO clinical classification is simplified to include only 3 forms (see next page)

The Ridley-Jopling classification of leprosy

Paucibacillary forms (least contagious forms)			**Multibacillary forms** (most contagious forms)	
Tuberculoid	Borderline Tuberculoid	Borderline	Borderline Lepromatous	Lepromatous
T.T.	B.T.	B.B.	B.L.	L.L.

Tuberculoid leprosy

– The primary characteristic is peripheral nerve involvement: tender, infiltrated and thickened nerves; loss of thermal, then tactile and pain sensation. This may lead to trophic ulcers and mutilations of the extremities.
– Lesions are single or few in number:
  • plaque with a well-demarcated raised border and an atrophic, clear centre
  or
  • erythematous macule on pale skin, hypopigmented macule on dark skin
– Nerve involvement develops late in the disease.

Lepromatous leprosy

– The primary characteristic is multiple muco-cutaneous lesions:
  • macules, papules or infiltrated nodules on the face, ear lobes and the upper and lower limbs. Lesions are bilateral, symmetrical, pigmented. Initially, there is no sensory loss.
  • involvement of the nasal mucosa with crusting and nose bleeds
  • oedema of the lower limbs
– Nerve involvement develops late in the disease.

Borderline leprosy

Forms between tuberculoid and lepromatous.

Indeterminate leprosy (I)

Form that does not fall in the Ridley-Jopling classification, frequent in children: a single well-demarcated macule, hypopigmented on dark skin, slightly erythematous on pale skin. Absence of sweat and hair, and loss of sensation are inconstant.
Lesion heals spontaneously or the disease evolves towards tuberculoid or lepromatous leprosy.

Lepra reactions

- *Reversal reactions*: occur in patients with borderline leprosy, during treatment, when evolving towards tuberculoid leprosy. Skin lesions become swollen and painful with a risk of necrosis and ulceration. Acute painful neuritis (ulnar nerve) requires urgent treatment (see page 115) as there is a risk of permanent sequelae.
- *Downgrading reactions*: occur in untreated patients with borderline leprosy, when the disease evolves towards lepromatous leprosy. These reactions are difficult to distinguish from reversal reactions.
- *Erythema nodosum leprosum*: crops of tender subcutaneous nodules, purplish-red, then yellowish in colour. This reaction is seen exclusively in patients with lepromatous leprosy during the first year of treatment.

In order to simplify diagnosis and to promote rapid implementation of treatment, the WHO simplified clinical classification of leprosy and differentiates only 3 forms:
- Multibacillary leprosy: more than 5 skin lesions
- Paucibacillary leprosy: 2 to 5 skin lesions
- Single skin lesion paucibacillary leprosy

Laboratory

Demonstration of acid-fast bacilli in a Ziehl-Neelsen stained smear:
- nasal smear
- skin-split smear taken from the ear lobe or from a skin lesion

In tuberculoid leprosy, bacilli are usually not found.

Treatment

Treatment of leprosy

- Leprosy is a curable disease. Early antibiotic treatment prevents functional sequelae and transmission of the disease.
- In countries where leprosy is endemic, it is important to be informed about national control programmes.
- The high rates of resistance and of recurrences after single drug therapy have led to the use of effective multi-drug therapy regimens which are easy to administer in the field and for which no resistance has been reported.
- Teach the patient to recognise and quickly report a lepra reaction or relapse in order to modify or restart treatment.

Treatment recommended by the WHO, based on the simplified clinical classification of leprosy

	Multibacillary leprosy (more than 5 skin lesions)	**Paucibacillary leprosy (2 to 5 skin lesions)**	**Paucibacillary leprosy (single skin lesion)**
Children under 10 years	**dapsone** PO: 25 mg once daily, self-administered + **rifampicin** PO: 300 mg once monthly, under supervision + **clofazimine** PO: 100 mg once monthly, under supervision and 50 mg 2 times weekly, self-administered	**dapsone** PO: 25 mg once daily, self-administered + **rifampicin** PO: 300 mg once monthly, under supervision	
Children between 10 and 14 years	**dapsone** PO: 50 mg once daily, self-administered + **rifampicin** PO: 450 mg once monthly, under supervision + **clofazimine** PO: 150 mg once monthly, under supervision and 50 mg on alternate days, self-administered	**dapsone** PO: 50 mg once daily, self-administered + **rifampicin** PO: 450 mg once monthly, under supervision	
Adults	**dapsone** PO: 100 mg once daily, self-administered + **rifampicine** PO: 600 mg once monthly, under supervision + **clofazimine** PO: 300 mg once monthly, under supervision and 50 mg once daily, self-administered	**dapsone** PO: 100 mg once daily, self-administered + **rifampicine** PO: 600 mg once monthly, under supervision	**rifampicin** PO: 600 mg + **ofloxacin** PO: 400 mg + **minocycline** PO: 100 mg
Duration	12 months	6 months	single dose

Treatment of leprosy reactions

– Reversal or downgrading reactions: **prednisolone** (or **prednisone**) PO: 1 mg/kg/day for 3 to 5 days then progressively decrease the dosage (reduce the dosage by 10% each week).
– Erythema nodosum leprosum: **clofazimine** PO, 100 to 300 mg/day associated with an NSAID (do not administer dosages equal to or greater than 300 mg/day for more than 3 months).

Herpes simplex and herpes zoster

Herpes simplex

Recurrent viral infection of the skin and mucous membranes due to the *herpes simplex virus*. Recurrent lesions have a different presentation than primary infection.

Clinical features

– Recurrent herpes labialis: tingling feeling followed by an eruption of vesicles on an erythematous base, located on the lips ('fever blisters') and around the mouth, they may extend onto the face. Recurrence corresponds to a reactivation of the latent virus after a primary infection. No associated malaise, adenopathy or fever.
– Carefully consider other sites: buccal (page 92), genital (page 236), ophthalmic, and secondary bacterial infections.

Treatment

– Clean with soap and water 2 times/day until the lesions have healed.
– For patients with secondary bacterial infections: antibiotic treatment as for impetigo (see page 105).

Herpes zoster (shingles)

Acute viral infection due to the varicella-zoster virus. Chickenpox is the primary infection and herpes zoster the reactivation of the latent virus.

Clinical features

– Unilateral neuralgic pain followed by an eruption of vesicles on a erythematous base, that follow the distribution of a nerve pathway.
– Lesions most commonly occur on the thorax, but herpes zoster may also develop on the face with a risk of ophthalmic complications.
– Herpes zoster is more common in adults than in children.

Treatment

– Similar to that of herpes simplex, with the addition of systematic analgesics: **paracetamol** PO (see *Pain*, page 29).
– **aciclovir** PO given within the first 48 hours after the eruption of lesions is only indicated for severe forms: necrotic or extensive lesions or lesion on the face which may spread to the eyes (see *HIV infection and AIDS*, page 219).

Other skin disorders

Eczema (dermatitis)

– Acute eczema: erythematous plaque, pruritic, vesicular, oozing, with poorly demarcated and crumbly borders.
– Chronic eczema: erythematous plaque, scaly, dry, poorly demarcated and pruritic.
– Look for a cause (contact allergic dermatitis, fungal or bacterial infection with a distant focus, malnutrition) and ask about family history.

Treatment

– Clean with soap and water 2 times/day.
– Then apply:
  • for acute eczema: **calamine** lotion 2 times/day
  • for chronic eczema: **zinc oxide ointment** 2 times/day
– Look for and treat any pre-existing skin disease (scabies, lice etc.).
– For patients with secondary infections: treat as impetigo (see page 105).
– For patients with intense pruritus:
  promethazine PO
  Children from 2 to 5 years: 5 to 15 mg once daily or in 2 divided doses
  Children from 5 to 10 years: 10 to 25 mg once daily or in 2 divided doses
  Children over 10 years and adults: 25 to 50 mg once daily or in 2 divided doses
  or **chlorphenamine** PO
  Children from 1 to 2 years: 1 mg 2 times daily
  Children from 2 to 6 years: 1 mg 4 to 6 times daily
  Children from 6 to 12 years: 2 mg 4 to 6 times daily
  Adults: 4 mg 4 to 6 times daily

Urticaria

– Papules: transient, erythematous, oedematous, pruritic, resembling nettle stings.
– Look for a cause: food or drug (particularly antibiotic) allergy, insect bites; the invasive stage of a bacterial or parasitic infection (ascariasis, strongylodiasis, ancylostomiasis, schistosomiasis, loiasis), viral infection (hepatitis B or C); generalised disease (cancer, lupus, dysthyroidism, vasculitis).

Treatment

– If the pruritus is intense, antihistamines (**promethazine** PO or **chlorphenamine** PO at the dosages indicated above) for a minimum of 7 days.

– For patients with Quincke's oedema:
epinephrine (**adrenaline**) IM
Infants and children: 0.01 mg/kg/injection
Adults: 0.25 to 0.75 mg/injection
to be repeated every 5 minutes if necessary according to the clinical evolution

give with **hydrocortisone** IM
Children: 2 to 4 mg/kg/injection
Adults: 100 to 500 mg/injection

– In the event of anaphylactic shock, see *Shock*, page 19.

Pellagra

Pellagra is a dermatitis resulting from niacin and/or tryptophane deficiency (in persons whose staple food is sorghum, maize not treated with lime; patients with malabsorption, or during famine).

Clinical features

Classically, disease of the 'three Ds': dermatitis, diarrhoea and dementia.

– Dark red plaques, well demarcated, symmetric, located on exposed areas of the body (forehead, neck, forearms, legs). The skin becomes very scaly, pigmented, sometimes with haemorrhagic bullae.

– Gastrointestinal (glossitis, stomatitis and diarrhoea) and neuropsychiatric symptoms are seen in more serious forms.

Traitement

– **nicotinamide** PO
Children and adults: 300 to 500 mg/day in 2 divided doses, give with a diet rich in protein until the patient is fully cured.

– In the event of an epidemic of pellagra, for example in a refugee camp, it is vital that the food ration be modified (add groundnuts or dry vegetables) in order to meet the daily requirements (approximately 15 mg/day for adults).

CHAPTER 5

Eye diseases

Xerophthalmia (vitamin A deficiency) 121

Conjunctivitis 123

Trachoma 126

Other pathologies 128
- Onchocerciasis
- Loiasis
- Pterygium
- Cataract

Xerophthalmia (vitamin A deficiency)

The term xerophthalmia covers all the ocular manifestations of vitamin A deficiency. Xerophthalmia can progress to irreversible blindness if left untreated.

In endemic areas, vitamin A deficiency and xerophthalmia affect mainly children (particularly those suffering from malnutrition or measles) and pregnant women.

Disorders due to vitamin A deficiency can be prevented by the routine administration of retinol.

Clinical features

– The first sign is hemeralopia (crepuscular blindness): the child cannot see in dim light, may bump into objects and/or show decreased mobility.

– Then, other signs appear gradually:
  • Conjunctival xerosis: bulbar conjunctiva appears dry, dull, thick, wrinkled and insensitive
  • Bitot's spots: greyish foamy patches on the bulbar conjunctiva, usually in both eyes (specific sign, however not always present).
  • Corneal xerosis: cornea appears dry and dull
  • Corneal ulcerations
  • Keratomalacia (the last and most severe sign of xerophthalmia): softening of the cornea, followed by perforation of the eyeball and blindness (extreme care must be taken during ophthalmic examination due to risk of rupturing cornea).

Treatment

It is essential to recognise and treat early symptoms to avoid the development of severe complications. Vision can be saved provided that ulcerations affect less than a third of the cornea and the pupil is spared. Even if deficiency has already led to keratomalacia and irreversible loss of sight, it is imperative to administer treatment, in order to save the other eye and the life of the patient.

– **Retinol** (**vitamin A**) PO
  Regardless of the clinical stage:
  Children from 6 to 12 months (or under 8 kg): 100 000 IU once daily on D1, D2 and D8
  Children over 1 year (or over 8 kg): 200 000 IU once daily on D1, D2 and D8
  Adults (except pregnant women): 200 000 IU once daily on D1, D2 and D8
  Vitamin A deficiency is rare in breast fed infants under 6 months, if needed: 50 000 IU once daily on D1, D2 and D8.

  In pregnant women, treatment varies according to the stage of illness:
  • Hemeralopia or Bitot's spots: 10 000 IU once daily or 25 000 IU once weekly for at least 4 weeks. Do not exceed indicated doses (risk of foetal malformations).
  • If the cornea is affected, risk of blindness outweighs teratogenic risk. Administer 200 000 IU once daily on D1, D2 and D8.

– Corneal lesions are a medical emergency. In addition to the immediate administration of retinol, treat or prevent secondary bacterial infections: apply **1% tetracycline eye ointment** twice daily (do not apply eye drops containing corticosteroids) and protect the eye with an eye-pad after each application.

Prevention

– Systematically administer retinol PO to children suffering from measles (one dose on D1 and D2) or malnutrition (single dose).

– In areas where vitamin A deficiency is common, routine supplementation of **retinol** PO:
Children under 6 months: 50 000 IU as a single dose
Children from 6 to 12 months: 100 000 IU as a single dose every 4 to 6 months
Children from 1 to 5 years: 200 000 IU as a single dose every 4 to 6 months
Mothers after giving birth: 200 000 IU as a single dose immediately after delivery or within 8 weeks of delivery

Note: to avoid excessive dosage, record any doses administered on the health/immunisation card and do not exceed indicated doses. Vitamin A overdose may cause raised intracranial pressure (bulging fontanelle in infants; headache, nausea, vomiting) and, in severe cases, impaired consciousness and convulsions. These adverse effects are transient; they require medical surveillance and symptomatic treatment if needed.

Conjunctivitis

Conjunctivitis is an acute inflammation of the conjunctiva due to a bacterial or viral infection, allergy, or irritation. Endemic or epidemic, conjunctivitis may be associated with measles or rhinopharyngitis in children. In the absence of hygiene and effective treatment, secondary bacterial infections may develop, affecting the cornea (keratitis) and leading to blindness.

Clinical features

– Clinical signs of all conjuctivites include: redness of the eye and irritation. Visual acuity is not affected.

– Depending on the cause:
  • abundant and purulent secretions, eyelids stuck together on waking, unilateral infection at onset: bacterial conjunctivitis
  • watery (serous) secretions, no itching: viral conjunctivitis
  • excessive lacrimation, eyelid oedema, intense itching: allergic conjunctivitis

– In endemic areas, turn both upper eyelids up to check for signs of trachoma (see *Trachoma*, page 126).

– Suspect keratitis if patient reports intense pain (more than is usually associated with conjunctivitis) and photophobia. Instill one drop of **0.5% fluorescein** to check for possible ulcerations.

– Always check for foreign bodies (subconjunctival or corneal) and remove after administering **0.4% oxybuprocaine** anaesthetic eye drops (two drops maximum). Never give bottle of eye drops to the patient.

Treatment

– *Bacterial conjunctivitis*
  • Clean eyes 4 to 6 times/day with boiled water or 0.9% sodium chloride.
  • Apply **1% tetracycline eye ointment** 2 times/day into both eyes for 7 days.
  • Never use corticosteroid drops or ointment.

– *Viral conjunctivitis*
  • Clean eyes 4 to 6 times/day with boiled water or 0.9% sodium chloride.
  • Apply local antibiotics if there is a (risk of) secondary bacterial infection (see above).

– *Allergic conjunctivitis*
  • Local treatment as for viral conjunctivitis.
  • Antihistamines for one to 3 days:
    promethazine PO
    Children from 2 to 5 years: 5 to 15 mg once daily or in 2 divided doses
    Children from 5 to 10 years: 10 to 25 mg once daily or in 2 divided doses
    Children over 10 years and adults: 25 to 50 mg once daily or in 2 divided doses
    or **chlorphenamine** PO
    Children from 1 to 2 years: 1 mg 2 times daily
    Children from 2 to 6 years: 1 mg 4 to 6 times daily
    Children from 6 to 12 years: 2 mg 4 to 6 times daily
    Adults: 4 mg 4 to 6 times daily

Note: in the event of a foreign body, check tetanus immunisation status.

Neonatal conjunctivitis

Conjunctivitis due to *Neisseria gonorrhoeae* and/or *Chlamydia trachomatis* in children born to infected mothers.

Clinical features

– Purulent conjunctivitis within the first 28 days of life.
– *Gonococcal conjunctivitis* usually occurs 2 to 7 days after birth. The infection is bilateral in 50% of cases, highly contagious and may rapidly lead to severe corneal lesions and blindness.
– *Chlamydial conjunctivitis* usually occurs 5 to 14 days after birth. The infection is often unilateral.

Prevention

Immediately at birth:
– Clean eyelids with sterile 0.9% sodium chloride.
– Apply **1% tetracycline eye ointment** once into both eyes.
  Failing the above, use **1% silver nitrate**: one drop into both eyes (silver nitrate is toxic and difficult to prepare and keep in solution. It is therefore not suitable for isolated settings).

Note:
In case of maternal *herpes simplex virus* infection at delivery:
– Clean eyelids with sterile 0.9% sodium chloride.
– Apply **3% aciclovir eye ointment** once into both eyes, then wait 12 hours to apply 1% tetracycline eye ointment.

Treatment

At dispensary level

Treatment is urgent and the child should be referred. When immediate hospitalisation is not possible, clean and apply **1% tetracycline eye ointment** into both eyes every hour, until systemic treatment is available.

At hospital level

– If possible isolate the newborn for 24 to 48 hours.
– Treatment of choice is **ceftriaxone** IM: 50 mg/kg as a single dose (without exceeding 125 mg) if only the eyes are infected.
  Failing the above, use **spectinomycin** IM: 25 mg/kg as a single dose (without exceeding 75 mg).
– Clean eyes with an isotonic sterile solution (0.9% sodium chloride or Ringer Lactate) to prevent secretions from adhering, and apply **1% tetracycline eye ointment** 4 times/day.
– If systemic treatment is not immediately available, apply **1% tetracycline eye ointment** into both eyes every hour until the treatment is available.
– Treat mother and partner (see *Genital infections*, page 229)
– If treatment with ceftriaxone fails, treat for chlamydia:
  erythromycin PO: 50 mg/kg/day in 2 or 3 divided doses for 14 days

Viral epidemic keratoconjunctivitis

(corneal and conjunctival lesions)

– Treat as viral conjunctivitis. If possible, refer to an ophthalmologist.
– Protect the eye with a compress as long as photophobia lasts. Remove as soon as possible.
– If necessary, administer a preventive dose of **vitamin A** (see page 122).

Trachoma

Trachoma is a highly contagious keratoconjunctivitis due to *Chlamydia trachomatis*. The disease is endemic in the poorest rural areas of Africa, Asia, Central and South America and the Middle East.

Infection is usually first contracted early in childhood by direct or indirect contact (dirty hands, contaminated towels, flies). In the absence of hygiene and effective treatment, the inflammation intensifies with successive infections, causing scars and deformities on the upper tarsal conjunctiva. The resulting ingrowing eyelashes (trichiasis) cause corneal lesions followed by permanent blindness, usually in adulthood.

The WHO classifies trachoma into 5 stages. Early diagnosis and treatment of first stages is essential to avoid the development of trichiasis and associated complications.

Clinical features

Several stages can occur simultaneously:

– Stage I: trachomatous inflammation - follicular (TF)
  Presence of five or more follicles in the upper tarsal conjunctiva. Follicles are whitish, grey or yellow elevations, paler than the surrounding conjunctiva.

– Stage II: trachomatous inflammation - intense (TI)
  The upper tarsal conjunctiva is red, rough and thickened. The blood vessels, normally visible, are masked by a diffuse inflammatory infiltration or follicles.

– Stage III: trachomatous scarring (TS)
  Follicles disappear, leaving scars: scars are white lines, bands or patches in the tarsal conjunctiva.

– Stage IV: trachomatous trichiasis (TT)
  Due to multiple scars, the margin of the eyelid turns inwards (entropion); the eyelashes rub the cornea and cause ulcerations and chronic inflammation.

– Stage V: corneal opacity (CO)
  Cornea gradually loses its transparency, leading to visual impairment and blindness.

Treatment

– Stages I and II:
  • Clean eyes and face several times per day.
  • Antibiotic therapy:
    The treatment of choice is **azithromycin** PO:
    Child over 6 months or over 6 kg: 20 mg/kg as a single dose
    Adult: 1 g as a single dose
    Failing the above, apply **1% tetracycline eye ointment**: 2 times/day for 6 weeks
    In children under 6 months or 6 kg: **erythromycin** PO (40 mg/kg/day in 2 divided doses for 14 days)

– Stage III: no treatment

– Stage IV: surgical treatment
  While waiting for surgery, if regular patient follow-up is possible, taping eyelashes to the eyelid is a palliative measure that can help protect the cornea. In certain cases, this may lead to permanent correction of the trichiasis within a few months.
  The method consists in sticking the ingrowing eyelashes to the external eyelid with thin strip of sticking-plaster, making sure that the eyelid can open and close perfectly. Replace the plaster when it starts to peel off (usually once a week); continue treatment for 3 months.
  Note: epilation of ingrowing eyelashes is not recommended since it offers only temporary relief and regrowing eyelashes are more abrasive to the cornea.

– Stage V: no treatment

Prevention

Cleaning of the eyes, face and hands with clean water reduces direct transmission and the development of secondary bacterial infections.

Other pathologies

Onchocerciasis (river blindness)

Ocular lesions result from the invasion of the eye by microfilariae. They generally develop in adults and progress to blindness in the absence of early treatment.

Clinical features and treatment

Ocular lesions are always associated with onchocercal skin lesions (see page 157).
– Pruritus, hemeralopia (crepuscular blindness), decrease in visual acuity, narrowing of the visual field, awareness of microfilariae in the visual field (the patient sees "little wiggling worms before his eyes").
– Lesions of the cornea (punctuate, then sclerosing, keratitis), iris (iridocyclitis) or posterior segment (chorioretinopathy and optic atrophy); microfilariae within the anterior chamber or vitreous humor (slit lamp).

For treatment, see *Onchocerciasis*, page 157. Ivermectin treatment may improve anterior segment lesions (sclerosing keratitis, iridocyclitis) and visual acuity. Severe lesions (chorioretinal lesions, optic atrophy) continue to progress despite treatment.

Loiasis

Clinical features and treatment

Migration of an adult worm under the palpebral or bulbar conjunctiva (white, filiform worm, measuring 4 to 7 cm in length, mobile) and ocular pruritus, lacrimation, photophobia or eyelid oedema.
For treatment, see *Loiais*, page 159. The migration of the worm is often of very brief duration. Do not attempt to extract it, or administer anaesthetic drops; simply reassure the patient, the event is harmless. Surgical removal is likewise futile if the worm is dead/calcified.

Pterygium

A whitish, triangular growth of fibrovascular tissue extending slowly from the conjunctiva to the cornea. It occurs most frequently in patients who are exposed to wind, dust, or arid climates and never disappears spontaneously.

Clinical features and treatment

Two stages:
– Benign pterygium develops slowly, does not reach the pupil: no treatment.
– Progressive vascularized pterygium: red and inflamed growth covers the pupil and may impair vision:
  • Clean eye with sterile water or 0.9% sodium chloride.
  • Surgical removal if facilities are available.

Cataract

Opacity of the lens that causes a progressive loss of visual acuity. Cataract is common in the tropics and can occur at a younger age than in Europe. The presence of cataract in both eyes leads to blindness. Surgery is the only treatment.

CHAPTER 6

Parasitic diseases

Protozoan infections

Malaria 131

Human african trypanosomiasis 139

American trypanosomiasis 142

Leishmaniases 144

Intestinal protozoan infections (parasitic diarrhoea) 147

Helminthic infections

Flukes 149

Schistosomiases 150

Cestodes 152

Nematode infections 154

Filariasis 157

Malaria

Malaria is a parasitic infection due to protozoa of the genus *Plasmodium*, transmitted to humans by the bite of *Anopheles* mosquitoes. Transmission by transfusion of parasite infected blood and transplacental transmission are also possible.
Most infections are due to four species: *P. falciparum*, *P. vivax*, *P. ovale* and *P. malariae*. All species may cause uncomplicated malaria; severe malaria (defined by the presence of complications) is almost always due to *P. falciparum*.
Clinical suspicion of malaria should be confirmed whenever possible by a parasitological diagnosis. However, treatment of suspected malaria should not be delayed when confirmatory testing is not available: uncomplicated malaria can progress rapidly to severe malaria, and severe malaria may cause death within a few hours if left untreated.

Clinical features

Malaria should always be considered in a patient living in or coming from an endemic area, who presents with fever (or history of fever in the previous 48 hours).

Uncomplicated malaria
Fever is frequently associated with chills, sweating, headache, muscular ache, malaise, anorexia or nausea. In children, fever may be associated with abdominal pain, diarrhoea and vomiting. Anaemia is frequent in children and pregnant women.

Severe malaria
In addition to the above, the patient presents with one or more of the following complications:
– Impaired consciousness, delirium or coma
– Seizures, generalised or focal (e.g. abnormal eye movements)
– Prostration (extreme weakness; in children: inability to sit or drink/suck)
– Respiratory distress: rapid and laboured breathing or slow, deep breathing
– Circulatory collapse (shock): cold extremities, weak or absent pulse, slow capillary refill time (> 3 seconds), cyanosis
– Jaundice (check mucosal surfaces of the mouth, conjunctivae and palms)
– Haemoglobinuria: dark red urine
– Abnormal bleeding: skin (petechiae), conjunctivae, nose, gums; blood in stools
– Acute renal failure: urine output < 12 ml/kg/day in children and < 400 ml/day in adults, despite adequate hydration

Patients presenting with any of the above features or with severe anaemia (see page 37) must be hospitalised immediately.

Laboratory diagnosis

Parasitological diagnosis

– *Microscopy*
Thin and thick blood films enable parasite detection, species identification, quantification and monitoring of parasitaemia.
Note: blood films may be negative due to sequestration of the parasitized erythrocytes in peripheral capillaries in severe malaria, as well as in placental vessels in pregnant women.

– *Rapid diagnostic tests (RDTs)*[1]
  Rapid tests detect parasite antigens. They give only a qualitative result (positive or negative) and may remain positive several days or weeks following effective treatment.

Note: even with positive diagnostic results, rule out other causes of fever.

Additional examinations
– Haemoglobin (Hb) level: to be measured routinely in all patients with clinical anaemia, and in all patients with severe malaria.
– Blood glucose level: to be measured routinely to detect hypoglycaemia (< 3 mmol/l or < 54 mg/dl) in patients with severe malaria and those with malnutrition.

Treatment of malaria due to P. vivax [2]*, P. malariae, P. ovale*

chloroquine (**CQ**) PO
Children and adults: 10 mg base/kg once daily on D1, D2
5 mg base/kg on D3

P. vivax and *P. ovale* can cause relapses due to activation of dormant parasites in the liver. A treatment with primaquine[3] can be given to eliminate these parasites, after the initial treatment with CQ. However, this treatment is reserved for patients living in areas where re-infection is unlikely, i.e. non-endemic or low transmission areas.

Treatment of uncomplicated falciparum malaria

Antimalarial treatment (for pregnant women, see page 138)

The treatment is an artemisinin-based combination therapy (ACT)[4] given by the oral route for 3 days. The first-line ACT is chosen according to therapeutic efficacy in the area under consideration. Coformulations (2 antimalarials combined in the same tablet) are preferred over coblisters (2 distinct antimalarials presented in the same blister). For dosing information, see table next page.

Artemisinin derivatives should not be used alone except in specific circumstances:
1) In young infants who have not attained the age required to be eligible for an ACT: **artesunate** PO is given alone in a dose of 4 mg/kg on D1, followed by 2 mg/kg once daily on D2 to D7.
2) When vomiting precludes oral therapy: treatment is started using the rectal (see artesunate suppositories, page 134) or IM route (see artemether IM, page 134), until the patient can tolerate a complete 3-day oral treatment with an ACT.

---

1 Most rapid tests detect the following antigens alone or in combination: HRP2 protein specific to *P. falciparum*; an enzyme (Pf pLDH) specific to *P. falciparum*; an enzyme (pan pLDH) common to all 4 plasmodium species. HRP2 may continue to be detectable for 2 to 3 weeks or more after parasite clearance; pLDH remains detectable for several days (up to 2 weeks) after parasite clearance.

2 In general, *P. vivax* remains sensitive to CQ but resistance is found in Papua New Guinea, the Solomon Islands, Burma, India, Indonesia and East Timor. In these regions, follow national recommendations.

3 **Primaquine** for 14 days: 0.25 to 0.5 mg/kg once daily in children > 4 years; 15 mg once daily in adults. Primaquine is contra-indicated in individuals with G6PD deficiency. The decision to prescribe primaquine must take into account the prevalence of G6PD deficiency in the population.

4 ACT: a combination of artemisinin or one of its derivatives (e.g. artesunate, artemether) with another antimalarial of a different class.

Treatment of uncomplicated falciparum malaria with ACTs

ACT	Presentation	Dosage
artemether/ lumefantrine (AL)	**Coformulated tablets** of 20 mg artemether/ 120 mg lumefantrine, in blister	On D1, the first dose is given at 0 hour and the 2nd dose at 8-12 hours. Subsequent doses on D2 and D3 are given twice daily (morning and evening).
	Blister child < 3 years (5 to 14 kg), 6 tab/blister	==> 1 tab twice daily on D1, D2, D3
	Blister child 3-8 years (15 to 24 kg), 12 tab/blister	==> 2 tab twice daily on D1, D2, D3
	Blister child 9-14 years (25 to 34 kg), 18 tab/blister	==> 3 tab twice daily on D1, D2, D3
	Blister > 14 years-adults (> 34 kg), 24 tab/blister	==> 4 tab twice daily on D1, D2, D3
artesunate-amodiaquine (AS-AQ)	**Coformulated tablets**, in blister	
	Blister child 2-11 months (4.5 to 8 kg), tab of AS 25 mg/AQ base 67.5 mg, 3 tab/blister	==> 1 tab once daily on D1, D2, D3
	Blister child 1-5 years (9 to 17 kg), tab of AS 50 mg/AQ base 135 mg, 3 tab/blister	==> 1 tab once daily on D1, D2, D3
	Blister child 6-13 years (18 to 35 kg), tab of AS 100 mg/AQ base 270 mg, 3 tab/blister	==> 1 tab once daily on D1, D2, D3
	Blister ≥ 14 years-adults (≥ 36 kg), tab of AS 100 mg/AQ base 270 mg, 6 tab/blister	==> 2 tab once daily on D1, D2, D3
	Co-blister	
	Coblister child ≤ 6 years, containing: 3 tab of AS 50 mg + 3 tab of AQ base 153 mg	5-11 months ==> 1/2 tab AS + 1/2 tab once daily on D1, D2, D3 1-6 years ==> 1 tab AS + 1 tab AQ once daily on D1, D2, D3
	Coblister child 7-13 years, containing: 6 tab of AS 50 mg + 6 tab of AQ base 153 mg	==> 2 tab AS + 2 tab AQ once daily on D1, D2, D3
	Coblister ≥ 14 years/adults, containing: 12 tab of AS 50 mg + 12 tab of AQ base 153 mg	==> 4 tab AS + 4 tab AQ once daily on D1, D2, D3
artesunate-sulfadoxine/pyramethamine (AS-SP)	**Co-blister**	
	Coblister child ≤ 6 years, containing: 3 tab of AS 50 mg + 1 tab of SP 500/25 mg	2-11 months ==> 1/2 tab AS once daily on D1, D2, D3 + 1/2 tab SP as a single dose on D1 1-6 years ==> 1 tab AS once daily on D1, D2, D3 + 1 tab SP as a single dose on D1
	Coblister child 7-13 years, containing: 6 tab of AS 50 mg + 2 tab of SP 500/25 mg	==> 2 tab AS once daily on D1, D2, D3 + 2 tab SP as a single dose on D1
	Coblister ≥ 14 years/adults, containing: 12 tab of AS 50 mg + 3 tab of SP 500/25 mg or Coblister ≥ 14 years/adults, containing: 6 tab of AS 100 mg + 3 tab of SP 500/25 mg	==> 4 tab AS once daily on D1, D2, D3 + 3 tab SP as a single dose on D1 ==> 2 tab AS once daily on D1, D2, D3 + 3 tab SP as a single dose on D1
	When coblisters are not available, administer separate tablets of artesunate 50 mg and sulfadoxine/pyrimethamine 500/25 mg, following the doses indicated for coblisters, as above.	
artesunate-mefloquine (AS-MQ)	**Separate tablets** of artesunate (AS) 50 mg and mefloquine (MQ) 250 mg	3-11 months ==> 1/2 tab AS once daily on D1, D2, D3 + 1/2 tab MQ as a single dose on D1 1-6 years ==> 1 tab AS once daily on D1, D2, D3 + 1 tab MQ as a single dose on D1 If the patient is nauseous, artesunate may be started alone on D1, and the dose of mefloquine deferred to D2. 7-13 years ==> 2 tab AS once daily on D1, D2, D3 + 2 tab MQ on D1 and 1 tab MQ on D2 ≥ 14 years/adults ==> 4 tab AS once daily on D1, D2, D3 + 4 tab MQ on D1 and 2 tab MQ on D2 If the patient is nauseous, artesunate may be started alone on D1, and mefloquine doses deferred to D2 and D3 (instead of D1 and D2).

In the event of failure of correctly administered treatment with a first line ACT, use another ACT or quinine PO.
quinine PO D1 to D7
Children and adults ≤ 50 kg: 30 mg/kg/day in 3 divided doses at 8-hour intervals
Adults > 50 kg: 1800 mg/day in 3 divided doses at 8-hour intervals

Reduced susceptibility to quinine has been observed in South-East Asia and Amazon region. In these areas, quinine is given in combination with doxycycline or clindamycin:
doxycycline PO D1 to D7
Children > 8 years and adults: 200 mg once daily
or, in children < 8 years:
clindamycin PO D1 to D7
20 mg/kg/day in 2 divided doses

Note: *P. falciparum* is resistant to chloroquine (CQ) in Africa, South America, South-East Asia and Oceania but appears to remain sensitive to CQ in Haiti and the Dominican Republic. In these regions, CQ remains the first line treatment (see non-falciparum malaria, page 132).

Symptomatic treatment

– Fever: paracetamol PO, see page 26.

Treatment of severe malaria

The patient must be hospitalised.

Antimalarial treatment (for pregnant women, see page 138)

At dispensary level:
Before transfer, administer either the first dose of **artemether** IM (loading dose, see below) or one dose of rectal **artesunate**:

Weight	50 mg artesunate suppository	200 mg artesunate suppository
3-5 kg	1	–
6-10 kg	2	–
11-20 kg	–	1
21-40 kg	–	2
41-60 kg	–	3
61-80 kg	–	4

At hospital level:
The drugs of choice are artemether IM or artesunate IV or IM:

artemether IM (into the anterior thigh):
Loading dose 3.2 mg/kg on D1, followed by 1.6 mg/kg once daily, until the patient can tolerate oral treatment (patient able to eat and drink).

Weight	20 mg ampoule artemether (20 mg/ml, 1 ml)		80 mg ampoule artemether (80 mg/ml, 1 ml)	
	Loading dose (3.2 mg/kg on D1)	Maintenance dose (1.6 mg/kg/day)	Loading dose (3.2 mg/kg on D1)	Maintenance dose (1.6 mg/kg/day)
< 3 kg	0.5 ml	0.3 ml	–	–
3-4 kg	0.8 ml	0.4 ml	–	–
5-6 kg	1.2 ml	0.6 ml	–	–
7-9 kg	1.6 ml	0.8 ml	–	–
10-14 kg	2.5 ml	1.2 ml	-	–
15-19 kg	3.2 ml	1.6 ml	-	–
20-29 kg	–	–	1.2 ml	0.6 ml
30-39 kg	–	–	1.6 ml	0.8 ml
40-49 kg	–	–	2 ml	1 ml
50-59 kg	–	–	2.5 ml	1.2 ml

Use a 1 ml syringe graduated in 0.01 ml when the dose required is less than 1 ml.

or
artesunate IV (or IM into the anterior thigh, if the IV route is not possible):
2.4 mg/kg at 0, 12, 24 hours, then once daily until the patient can tolerate oral treatment.
Follow manufacturer's instructions to make the appropriate dilution.

After the initial treatment with parenteral artemether or artesunate, administer a 3-day course of ACT[5] (see *uncomplicated falciparum malaria*, page 132).
Exclusively in children who have not attained the age required to be eligible for an ACT, oral completion treatment is provided with artesunate PO to complete 7 days of treatment (page 132).

Quinine IV is an alternative. The dose is expressed in quinine salt:
– Loading dose: 20 mg/kg to be administered over 4 hours, then, keep the vein open with an infusion of 5% glucose over 4 hours; then
– Maintenance dose: 8 hours after the start of the loading dose, 10 mg/kg every 8 hours (alternate quinine over 4 hours and 5% glucose over 4 hours).

For adults, administer each dose of quinine in 250 ml of glucose. For children under 20 kg, administer each dose of quinine in a volume of 10 ml/kg of glucose.
Do not administer a loading dose to patients who have received oral quinine, mefloquine or halofantrine within the previous 24 hours: start with maintenance dose.
As soon as the patient can tolerate oral treatment, administer either a 3-day course of ACT[5] or oral quinine (± doxycycline or clindamycin, if necessary, see page 134) to complete 7 days of treatment.
If the combination AS-MQ is used as oral completion treatment following IV quinine, an interval of 12 hours should elapse between the last dose of quinine and the administration of MQ.

[5] Do not use AS-MQ if the patient developed neurological signs during the acute phase.

Artemisinin derivatives may not be well absorbed when administered IM to patients in shock: for these patients, use artesunate IV or quinine IV.

Note: in isolated areas, when it is *absolutely* impossible to transfer a patient to a facility where parenteral antimalarial treatment can be administered, artesunate suppositories must be administered once daily, until the patient is able to take a 3-day course of ACT.

Symptomatic treatment and management of complications

Hydration

Maintain adequate hydration. As a guide, volume to be administered per 24 hours by oral or IV route:

Weight	5 to 9 kg	10 to 19 kg	20 to 29 kg	≥ 30 kg
Total volume/24 hours	120 ml/kg	80 ml/kg	60 ml/kg	50 ml/kg

Adjust the volume according to clinical condition in order to avoid dehydration or fluid overload (risk of pulmonary oedema).

When the IV route is used, alternate Ringer lactate (or 0.9% sodium chloride) and 5% glucose. Volumes of fluids used to administer drugs are included in the total volume to be administered over 24 hours.
Treat dehydration, if present (pages 306 to 311).

Fever

– Paracetamol, see page 26.

Severe anaemia

– Blood transfusion is indicated:
  • In children with Hb < 4g/dl (or between 4 and 6 g/dl with signs of decompensation[6]).
  • In pregnant women with Hb < 7g/dl (before 36 weeks) or Hb < 8 g/dl (at 36 weeks or later).
– In other patients with Hb < 7 g/dl, monitor clinical status and Hb level and consider transfusion on a case-by-case basis.

Hypoglycaemia

– If the patient is able to swallow:
  50 ml of 10% glucose, or 40 ml of water + 10 ml of 50% glucose, or 50 ml of water + 5 g (1 teaspoon) of granulated sugar, or 50 ml of milk.
– Chez un patient inconscient :
  10% glucose: 5 ml/kg by infusion or slow IV injection (5 minutes), or **50% glucose**: 1 ml/kg by slow IV injection (5 minutes). 10% glucose is preferred in children as it is less viscous and irritating than 50% glucose[7]).
– Check blood glucose level after 30 minutes. If blood glucose level remains < 3 mmol/l or < 54 mg/dl, administer another dose or give glucose by oral route, according to the patient's clinical condition. Hypoglycaemia may recur: maintain regular sugar intake (5% glucose, milk, according to circumstances) and continue to monitor for several hours.

---

6 Clinical signs of decompensation may include: shock, impaired consciousness or respiratory distress (acidosis).
7 Glucose 50% at 1 ml/kg may be used in children, but must first be diluted with an equal volume of infusion fluid to reduce viscosity, then administered by slow IV injection.

Notes
– In an unconscious or prostrated patient, in case of emergency or when venous access is unavailable or awaited, use granulated sugar by the sublingual route to correct hypoglycaemia: place a level teaspoon of sugar, moistened with a few drops of water, under the tongue, then place the patient in the recovery position. Repeat after 15 min if the patient has not regained consciousness. As with other methods for treating hypoglycaemia, maintain regular sugar intake, and monitor.
– The risk of hypoglycaemia is higher in patients receiving IV quinine, especially pregnant women.

Coma

Check/ensure the airway is clear, measure blood glucose level and assess level of consciousness (Blantyre or Glasgow coma scale).
In the event of hypoglycaemia or if blood glucose level cannot be measured, administer glucose.
If the patient does not respond to administration of glucose, or if hypoglycaemia is not detected:
– Exclude meningitis (lumbar puncture) or proceed directly to administration of an antibiotic (see *Meningitis*, page 165).
– Insert a urinary catheter; place the patient in the recovery position.
– Reposition the patient every 2 hours; ensure eyes and mouth are kept clean and moist, etc.
– Monitor vital signs, blood glucose level, level of consciousness, urine output, hourly until stable, then every 4 hours.
– Monitor fluid balance.

Seizures

See page 23. Address possible causes (e.g. hypoglycaemia; fever in children).

Respiratory distress

– Rapid laboured breathing:
Check for pulmonary oedema, which may occur with or without fluid overload: reduce IV infusion rate if the patient is receiving IV therapy, nurse semi-sitting, oxygen, **furosemide** IV: 1 mg/kg in children, 40 mg in adults. Repeat after 1 to 2 hours if necessary.
Associated pneumonia should also be considered (see *Pneumonia*, page 66).

– Slow, deep breathing (acidosis):
Look for dehydration (and correct if present), decompensated anaemia (and transfuse if present).

Oliguria and acute renal failure

Look first for dehydration (page 305), especially due to inadequate fluid intake or excessive fluid losses (high fever, vomiting, diarrhoea). Treat dehydration, if present (pages 306 to 311). Be aware of the risk of fluid overload and acute pulmonary oedema. Monitor for the return of urine output.

Acute renal failure (ARF) is found almost exclusively in adults and is more common in Asia than Africa. ARF should be suspected if urine output remains < 400 ml/day or < 20 ml/hour (< 12 ml/kg/day in children) despite adequate rehydration. Insert a urinary catheter, measure output. Restrict fluids to 1 litre/day (30 ml/kg/day in children), plus additional volume equal to urine output. Renal dialysis is often necessary.

Antimalarial treatment in pregnant women

– Malaria due to *P. vivax, P. ovale, P. malariae*
chloroquine PO, as in other patients (see page 132).
Primaquine (radical cure of *P. vivax* and *P. ovale*) is contra-indicated.

– Uncomplicated falciparum malaria
During the first trimester, quinine PO (± clindamycin) is recommended. The safety of artemisinin derivatives has not yet been definitely established. However, given the risks associated with malaria, an ACT may be used if it is the only effective treatment available.
During the 2nd and 3rd trimesters, the treatment of choice is an ACT; quinine (± clindamycin) is an alternative.

– Severe malaria
During the first trimester, quinine IV is recommended. However, a parenteral artemisinin derivative may be used if it is the only effective treatment available.
During the 2nd and 3rd trimesters, preferred first-line treatment is a parenteral artemisinin derivative, followed by a 3-day course of ACT; quinine (± clindamycin) is an alternative.

Prevention [8]

– In pregnant women, in areas with high risk of infection with *P. falciparum* sensitive to sulfadoxine/pyrimethamine, an intermittent preventive treatment (IPT) can be administered at regular intervals (refer to the MSF handbook, *Obstetrics*).

– In malaria endemic zones and in epidemic-prone contexts, all in-patient facilities (including HIV treatment centres and feeding centres), should be furnished with long-lasting insecticidal nets (LLINs).

[8] See specialised literature for other information regarding anti-vector measures and prevention of malaria in travellers.

Human african trypanosomiasis (sleeping sickness)

Human african trypanosomiasis (HAT) is a zoonosis caused by protozoa (trypanosomes), transmitted to humans through the bite of a tsetse fly (*Glossina*). Transmission by contaminated blood transfusion and transplacental transmission are also possible.
The disease is found only in sub-Saharan Africa. There are two forms: *Trypanosoma brucei gambiense* HAT in western and central Africa and *Trypanosoma brucei rhodesiense* HAT in eastern and southern Africa.

Clinical features

Inoculation may be followed by an immediate local reaction (trypanosomal chancre). This chancre arises in about 50% of all rhodesiense but rarely in gambiense.

Gambiense HAT

- Incubation lasts from a few days to several years.
- The first stage (haemolymphatic stage) corresponds to the haematogenous and lymphatic dissemination of the parasite. Signs include intermittent fever, joint pain, lymphadenopathy (firm, mobile, painless lymph nodes, mainly cervical), hepatosplenomegaly and skin signs (facial oedema, pruritus).
- The second stage (meningoencephalitic stage) corresponds to the invasion of the central nervous system. Signs of the haemolymphatic stage recede or disappear and varying neurological signs progressively develop: sensory disturbances (deep hyperaesthesia), psychiatric disorders (apathy or agitation), disturbance of the sleep cycle (with daytime somnolence alternating with insomnia at night), impaired motor functions (paralysis, seizures, tics) and neuroendocrine disorders (amenorrhoea, impotence).
- In the absence of treatment: cachexia, lethargy, coma and death.

Rhodesiense HAT

The first stage is the same as above, but the incubation period is shorter (< 3 weeks), the disease evolves more rapidly and symptoms are more severe. Patients often die of myocarditis in 3 to 6 months without having developed signs of the meningo-encephalitic stage.

In practice, gambiense and rhodesiense HAT can be difficult to differentiate: e.g., there exist cases of acute gambiense infection and others of chronic rhodesiense infection.

Laboratory

- Diagnosis involves 3 steps for gambiense HAT (screening test, diagnostic confirmation and stage determination) and 2 steps for rhodesiense HAT (diagnostic confirmation and stage determination).
- The recommended screening test for *T.b. gambiense* infection is the CATT (Card Agglutination Test for Trypanosomiasis). It detects the presence of specific antibodies in the patient's blood or serum.

– Diagnostic confirmation: presence of trypanosomes in lymph node aspirates or in blood using concentration techniques: capillary tube centrifugation technique (Woo test), quantitative buffy coat (QBC), mini-anion exchange centrifugation technique (mAEC).
– Stage determination: detection of trypanosomes (after centrifugation) and white cell count in the cerebrospinal fluid (lumbar puncture):
  • Haemolymphatic stage: no trypanosomes AND ≤ 5 white cells/mm^3
  • Meningoencephalitic stage: evidence of trypanosomes OR > 5 white cells/mm^3

Treatment (except in pregnant women)

– Due to the toxicity of trypanocides, detection of the parasite is essential before initiating treatment. In the absence of parasitological confirmation, treatment may nevertheless be justified in certain cases: very strong clinical suspicion, patients in life-threatening condition, strong serological suspicion (CATT 1:16 positive) in a population where the disease is highly prevalent (> 2%).
– Several treatment regimens exist. Check national recommendations and local resistance levels.
– Treatment must be administered under close medical supervision. Patients receiving pentamidine can be treated as outpatients but those receiving suramin, eflornithine (with or without nifurtimox) or melarsoprol should be hospitalised.
– After treatment, patients should be checked every 6 months (clinical examination, lumbar puncture and examination for trypanosomes) over 24 months, to look for relapse.

Haemolymphatic stage (Stage I)

Gambiense HAT

pentamidine isetionate deep IM
Children and adults: 4 mg/kg once daily for 7 to 10 days
Patients should receive a source of glucose (meal, sweet tea) one hour before injection (risk of hypoglycaemia); they should remain supine during administration and one hour after injection (risk of hypotension).

Rhodesiense HAT

suramin slow IV
Children and adults: D1: test dose of 4 to 5 mg/kg
D3, D10, D17, D24, D31: 20 mg/kg without exceeding 1 g/injection
Suramin may cause anaphylactic reactions, a test dose is recommended prior to starting treatment. In the event of an anaphylactic reaction after the test dose, the patients must not be given suramin again.

Meningoencephalitic stage (Stage II)

Before administrating trypanocides, the priority is to improve the patient's general condition (rehydration, treatment of malaria, intestinal worms, malnutrition, bacterial infections). It is nonetheless recommended not to postpone the trypanocidal treatment for more than 10 days.

Gambiense HAT

First choice: nifurtimox-eflornithine combination therapy (NECT)
nifurtimox PO
Children and adults: 15 mg/kg/day in 3 divided doses for 10 days
+
eflornithine IV infusion over 2 hours
Children and adults: 400 mg/kg/day in 2 divided infusions (every 12 hours) for 7 days

The catheter must be handled with great attention to avoid local or general bacterial infections: thoroughly disinfect the insertion site, ensure secure catheter fixation, protect the insertion site with a sterile dressing, systematically change the catheter every 48 hours or earlier in case of signs of phlebitis.

Second choice: **eflornithine** IV infusion over 2 hours
Children under 12 years: 600 mg/kg/day in 4 divided infusions (every 6 hours) for 14 days
Adults: 400 mg/kg/day in 4 divided infusions (every 6 hours) for 14 days

In the event of a relapse after NECT or eflornithine:
melarsoprol slow IV
Children and adults: 2.2 mg/kg once daily for 10 days
Prednisolone PO (1 mg/kg once daily) is frequently combined throughout the duration of treatment.
Melarsoprol is highly toxic: reactive encephalopathy (coma, or recurrent or prolonged seizures) in 5 to 10% of treated patients, fatal in around 50% of cases; peripheral neuropathy, invasive diarrhoea, severe skin rash, phlebitis, etc.

Rhodesiense HAT

melarsoprol slow IV
Children and adults: 3.6 mg/kg/day for 3 to 4 days, repeated 3 or 4 times with an interval of 7 to 10 days between each series

Treatment in pregnant women

All trypanocides are potentially toxic for the mother and the foetus (risk of miscarriage, malformation, etc.). However, due to the life-threatening risk for the mother and the risk of mother-to-child transmission, treatment must be initiated as follows:

Haemolymphatic stage:
pentamidine for gambiense HAT as of the second trimester and **suramin** for rhodesiense HAT.

Meningoencephalitic stage:
Treatment depends on the mother's condition:
– If in immediately life-threatening condition: treatment with **NECT** or **eflornithine** cannot be deferred until after delivery.
– If not immediately life-threatening condition: **pentamidine** for gambiense HAT and **suramin** for rhodesiense HAT. Treatment with NECT or eflornithine is to be administered after delivery.

Prevention and control

– Individual protection against tsetse fly bites: long sleeves and trousers, repellents, keeping away from risk areas (e.g. near rivers).
– Disease control: mass screening and treatment of patients (*T.b. gambiense*), trypanocide treatment of cattle (*T.b. rhodesiense*), vector control using tsetse fly traps or insecticides.

American trypanosomiasis
(Chagas' disease)

– Chagas' disease is a zoonosis due to the flagellated protozoan parasite *Trypanosoma cruzi*, transmitted to man by triatomine bugs (reduviidae) through a break in the skin or mucous membranes. Transmission by contaminated blood transfusion and transplacental transmission are also possible.

– The disease is only found on the American continent in the area between the south of Mexico and the south of Argentina.

Clinical features

– ***Acute phase***

- Depending on the inoculation site, the first sign is a skin chancre or unilateral purplish orbital oedema (Romaña's sign) with local lymphadenopathy and fever (38°C, higher in children) over several weeks.
- This is followed by multiple lymphadenopathies, hepatosplenomegaly, myocarditis (chest pain, heart failure), sometimes meningoencephalitis (seizures, paralysis).
- Acute phase may be asymptomatic or subclinical.

The transition from the acute to chronic phase does not always occur.

– ***Chronic phase***

- Follows a long latent period after the acute phase: cardiac lesions (arrhythmia and conduction disorders, cardiomyopathy, heart failure, chest pain, thromboembolism) and gastrointestinal lesions (megaoesophagus and megacolon).
- Most patients are asymptomatic.

Laboratory

– ***Acute phase***

- Thin or thick film: detection of the parasite in blood or lymph nodes.
- Serologic tests: detection of anti-*Trypanosoma cruzi* antibodies.
- Xenodiagnosis: examination of the faeces of uninfected triatomine bug fed with the patient's blood.

– ***Chronic phase***

- Serologic tests: detection of anti-*Trypanosoma cruzi* antibodies.

Treatment

– ***Acute phase***

nifurtimox PO (contra-indicated in the first trimester of pregnancy, breast-feeding or in patients with history of mental disorders or seizures):
Patient under 40 kg: 10 to 12 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
Patient over 40 kg: 8 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
The adverse effects of nifurtimox (anorexia, nausea, gastric pain, agitation, sleeping disorders, seizures) occur in less than 20% of cases and must not result in treatment discontinuation. Avoid alcohol during treatment.
or
benznidazole PO (contra-indicated in the first trimester of pregnancy and breast-feeding):
Patient under 40 kg: 7.5 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
Patient over 40 kg: 5 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
The minor adverse effects of benznidazole (nausea, skin rash) occur in about 50% of patients. In the event of purpura with fever, paraesthesia or peripheral polyneuritis, stop treament.

– ***Chronic phase in children under 12 years***

benznidazole PO
Children under 40 kg: 7.5 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
Children over 40 kg: 5 mg/kg/day in 2 to 3 divided doses for 30 to 60 days

– ***Chronic phase in children over 12 years and adults***

Do not treat in the event of pregnancy, breast-feeding, hepatic or renal failure, or a severe intercurrent pathology.
nifurtimox PO: 8 to 10 mg/kg/day in 2 to 3 divided doses for 60 to 90 days
or
benznidazole PO: 5 mg/kg/day in 2 to 3 divided doses for 60 days

– ***Symptomatic treatment***

See seizures (page 23), pain (page 29) and heart failure (page 294).

Prevention

– Improvement of housing and vector control: plastered walls and cement floors, corrugated-iron roofs, insecticide spraying.
– Blood transfusions: screening donor blood for *T. cruzi* infection.

Leishmaniases

– Leishmaniases are parasitic diseases of man and numerous animals due to protozoa of the genus *Leishmania*, transmitted by the bite of sandflies.

– **Cutaneous** leishmaniasis occurs in Southern Europe, Asia (Middle-East, Afghanistan, Pakistan), Africa and Latin America.

– **Mucocutaneous** leishmaniasis occurs in Latin America and, more rarely, in Africa (Ethiopia, Sudan).

– **Visceral** leishmaniasis or kala-azar occurs in East and North Africa, Asia (India, Pakistan, Bangladesh, Nepal, China), Southern Europe and Latin America.

Clinical features

Cutaneous and mucocutaneous leishmaniases

Single or multiple lesions on the uncovered parts of the body: a papule that extends in surface and depth to form a scabbed ulcer in the "dry" forms. The "wet" forms progress more rapidly and are more damaging.

Usually, lesions heal spontaneously, leaving a scar. Lesions may also spread to the mucosa (mouth, nose, conjunctiva) giving rise to the mucocutaneous form which may cause severe disfigurement.

Visceral leishmaniasis

Fever (of any type: persistent, undulating, in peaks) and splenomegaly are the 2 main signs. Weight loss and lymphadenopathies are frequent. Other signs: epistaxis, pallor, anaemia, hepatomegaly and diarrhoea.

Untreated visceral leishmaniasis leads to death.

Post-kala-azar dermal leishmaniasis

Cutaneous lesions of unknown aetiology, occuring after treatment of visceral leishmaniasis. The mucosa may be involved. In severe cases, systemic treatment as for visceral leishmaniasis is necessary (pentavalent antimonials, paromomycin).

Laboratory

– Parasitological diagnosis:
  • tissue biopsy from the edge of the ulcer for cutaneous forms
  or
  • splenic, bone marrow, lymph nodes aspiration-biopsy for the visceral form (splenic aspiration is the most sensitive technique but carries a theoretical risk of potentially fatal haemorrhage)
  then
  • demonstration of *Leishmania* in smear, Giemsa staining: parasites lying free or sometimes intracellular (inside macrophages).

– Serological diagnosis: ELISA and IFAT. Direct agglutination test (DAT) can be used in the field when a laboratory is not available.
– In visceral leishmaniasis: raised ESR and pancytopenia.

Treatment

The various species of *Leishmania* respond differently to drugs. Consider national recommendations. For information:

Cutaneous and mucocutaneous leishmaniases

– Forms with a single lesion or few lesions: start by local treatment with a pentavalent antimonial:
meglumine antimoniate or **sodium stibogluconate**: 1 to 3 ml infiltrated into the edge and base of the lesion and repeated if necessary. The IM route is restricted to severe cases and must be administered under close medical supervision.
– Mucocutaneous forms: systemic treatment as for visceral leishmaniasis, with **meglumine antimoniate** or **sodium stibogluconate** or **amphotericin B** (see below).

Visceral leishmaniasis

– Start treatment with a pentavalent antimonial:
meglumine antimoniate IM (81 mg Sb^{5+}/ml) or **sodium stibogluconate** IM (100 mg Sb^{5+}/ml)
The doses, expressed in terms of antimony, are the same for both drugs:
Children and adults: 20 mg/kg once daily for 30 days
– Symptomatic treatment of fever, anaemia (iron + folic acid, see *anaemia*, page 37) and the frequent intercurrent infections (malaria, dysentery, pneumonia, etc.) is crucial. HIV infection may also be present.
– Hydration and high-protein high-calorie diet.

Second-line treatment in the event of non-response to pentavalent antimonials

– **paromomycin** (**aminosidine**) IM
Children and adults: 15 mg/kg once daily for 21 days in combination with a pentavalent antimonial as above.
Paromomycin may also be used alone. The dosage and treatment duration vary depending on the regimen.

or

– **liposomal amphotericin B** (less toxic than amphotericin B) by strict IV infusion in 5% glucose over one hour:
Children and adults: the total dose administered over the full course of treatment is usually 24 mg/kg divided in 6 infusions, i.e. 4 mg/kg/infusion once daily for 6 days or on alternate days for 2 weeks.
Start with a 1-mg dose administered by slow IV route (over 10 to 15 minutes) to test for allergic reactions and patient tolerance.

or, failing that,

– **amphotericin B** IV infusion in 5% glucose over 4 hours:
  The drug is active but nephrotoxic. Do not exceed the indicated doses.
  Children and adults: start with a 1-mg dose by slow IV (over 20 to 30 minutes) to test for allergic reactions and patient tolerance. Gradually increase, by increments of 5 to 10 mg/day, to a dose of 0.5 to 1 mg/kg/day, maximum, administered on alternate days. The total dose administered over the full course of treatment is usually 20 mg/kg.

or

– **pentamidine** slow deep IM injection (with the patient supine):
  Can be used, but the drug is more toxic and less effective than pentavalent antimonials.
  Children and adults: 4 mg/kg/injection on alternate days for a total treatment duration of 5 to 25 weeks, until no parasites are detected on microscopy (for visceral leishmaniasis, 2 negative biopsy-aspirates at an interval of 14 days).

Prevention

– Insecticide-impregnated mosquito nets.

– Vector control and elimination of animal reservoir hosts.

Intestinal protozoan infections (parasitic diarrhoea)

The most important intestinal protozoan infections are amoebiasis (*Entamoeba histolytica*), giardiasis (*Giardia lamblia*), cryptosporidiosis (*Cryptosporidium sp*), cyclosporiasis (*Cyclospora cayetanensis*) and isosporiasis (*Isospora belli*).

Intestinal protozoa are transmitted by the faecal-oral route (soiled hands, ingestion of food or water contaminated with faeces) and may cause both individual cases of diarrhoea and epidemic diarrhoea outbreaks.

Clinical features

– Amoebiasis gives rise to bloody diarrhoea, see Chapter 3, page 88.
– Clinical presentation of giardiasis, cryptosporidiosis, cyclosporiasis and isosporiasis is very similar:
  • Diarrhoea is usually mild and self-limiting, except in children and patients with advanced HIV disease (CD4 < 200). These patients are likely to develop severe, intermittent or chronic diarrhoea that may be complicated by malabsorption with significant wasting (or failure to gain weight in children) or severe dehydration.
  • Stools are usually watery, but steatorrhoea (pale, bulky, fatty stools) may be found in the event of secondary fat malabsorption; stools may contain mucus.
  • Diarrhoea is usually associated with non-specific gastrointestinal symptoms (abdominal distension and cramps, flatulence, nausea, anorexia), but patients have low-grade fever or no fever.

Laboratory

Definitive diagnosis relies on parasite identification in stool specimens (trophozoites and cysts for giardia; oocysts for cryptosporidium, cyclospora, isospora). Two to three samples, collected 2 to 3 days apart are necessary, as pathogens are shed intermittently.

Treatment

– Correct dehydration if present (for clinical features and management, see pages 305 and 311).

– If the causal agent has been identified in the stool:

Giardiasis	**tinidazole** PO as a single dose or **metronidazole** PO for 3 days Children: 50 mg/kg (max.2 g) Children: 30 mg/kg/day in 3 divided doses Adults: 2 g Adults: 2 g/jour en une prise
Cryptosporidiosis	In immunocompetent patients, no aetiological treatment; spontaneous resolution in 1 to 2 weeks.
Cyclosporiasis	**co-trimoxazole** PO for 7 days Children: 50 mg SMX + 10 mg TMP/kg/day in 2 divided doses Adults: 1600 mg SMX + 320 mg TMP/day in 2 divided doses In immunocompetent patients, symptoms usually resolve spontaneous in 1 to 3 weeks. Treatment is given in case of severe or prolonged symptoms.
Isoporiasis	**co-trimoxazole** PO for 7 to 10 days Adults: 1600 to 3200 mg SMX + 320 to 640 mg TMP/ day in 2 divided doses In immunocompetent patients, symptoms usually resolve spontaneous in 2 to 3 weeks. Treatment is given in case of severe prolonged symptoms.

– If reliable stool examination cannot be carried out: parasitic diarrhoeas cannot be differentiated on clinical grounds, nor is it possible to distinguish these from non-parasitic diarrhoeas. An empirical treatment (using tinidazole or metronidazole and cotrimoxazole as above, together or in succession) may be tried in the case of prolonged diarrhoea or steatorrhoea. In patients with HIV infection, see empirical treatment, page 213.

– In patients with advanced HIV disease, cryptosporidiosis, cyclosporiasis and isosporiasis are opportunistic infections; the most effective intervention is the treatment of the underlying HIV infection with antiretrovirals. Patients remain at high risk for dehydration/death until immunity is restored.

Flukes

Infection/Epidemiology	Clinical features/Diagnosis	Treatment
Lung flukes *Paragonimus* sp *Distribution*: South-East Asia, China, parts of Cameroon, Nigeria, Gabon, Congo, Colombia, Peru *Transmission*: eating raw freshwater crustaceans	The two most prominent symptoms are prolonged (> 2 weeks) productive cough and intermittent haemoptysis (rusty-brown sputum). In endemic areas, paragonimosis should be considered whenever pulmonary tuberculosis is suspected as the clinical and radiological features overlap. Paragonimosis is confirmed when eggs are detected in sputum (or possibly in stools).	**praziquantel** PO Children > 2 years and adults: 75 mg/kg/day in 3 divided doses for 2 to 3 days
Hepatobiliary flukes *Fasciola hepatica* and *gigantica* *Distribution*: worldwide, in areas where sheep and cattle are raised *Transmission*: eating uncooked aquatic plants	*During migration phase*: asthenia, prolonged fever, myalgia, right upper quadrant pain, mid hepatomegaly; sometimes, allergic signs (e.g. pruritus). At this stage, the diagnosis is rarely considered and can only be confirmed through serology; parasitological examination of stools is always negative. *Once adult flukes are present in the biliary tract*: presentation resembles cholelithiasis: right upper quadrant pain, recurrent episodes of obstructive jaundice/febrile cholangitis. The diagnosis is confirmed when parasite eggs are detected in stools (or flukes are seen in the biliary tract with sonography).	**triclabendazole** PO Children and adults: 10 mg/kg as a single dose May repeat in 24 hours in the event of severe infection
Opisthorchis felineus (Asia, Eastern Europe) *Opisthorchis viverrini* (Cambodia, Laos, Vietnam, Thailand) *Clonorchis sinensis* (China, Koera, Vietnam) *Transmission*: eating raw/undercooked freshwater fish	Abdominal pain and diarrhoea. With heavy infection, hepatobiliary symptoms: hepatomegaly, right upper quadrant pain, jaundice or episodes of febrile cholangitis. The diagnosis is confirmed when parasite eggs are detected in stools.	**praziquantel** PO Children > 2 years and adults: 75 mg/kg/day in 3 divided doses for 1 or 2 days
Intestinal flukes *Fasciolopsis buski* (India, Bangladesh, South-East Asia) *Heterophyes heterophyes* (South-East Asia, Nile delta) *Metagonimus yokogawai* (Siberia, China, Korea) *Transmission*: eating uncooked aquatic plants (*F. buski*), raw/undercooked fish (*other species*)	Symptoms are limited to diarrhoea and epigastric or abdominal pain. With massive infection, *F. buski* can cause oedematous allergic reactions (including ascites, anasarca). The diagnosis is confirmed when parasite eggs are detected in stools.	**praziquantel** PO Children > 2 years and adults: 75 mg/kg/day in 3 divided doses for 1 day

Schistosomiases

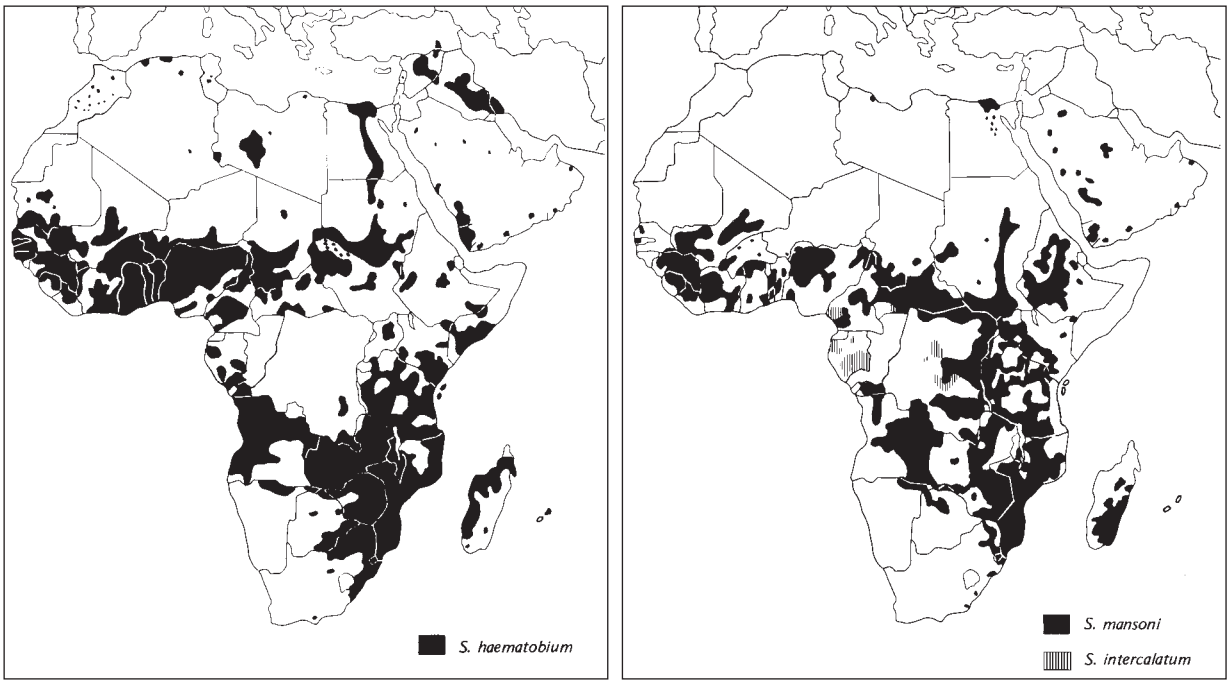
Schistosomiases are acute or chronic visceral parasitic diseases due to 5 species of trematodes (schistosomes).
The three main species infecting humans are *Schistosoma haematobium*, *Schistosoma mansoni* and *Schistosoma japonicum*. *Schistosoma mekongi* and *Schistosoma intercalatum* have a more limited distribution (see table next page).

Humans are infected while wading/bathing in fresh water infested with schistosome larvae. Symptoms occurring during the phases of parasite invasion (transient localized itching as larvae penetrate the skin) and migration (allergic manifestations and gastrointestinal symptoms during migration of schistosomules) are frequently overlooked. In general, schistosomiasis is suspected when symptoms of established infection become evident (see table next page).

Each species gives rise to a specific clinical form: genito-urinary schistosomiasis due to *S. haematobium*, intestinal schistosomiasis due *S. mansoni*, *S. japonicum*, *S. mekongi* and *S. intercalatum*.

The severity of the disease depends on the parasite load. Heavily infected patients are prone to visceral lesions with potentially irreversible sequelae.
Children aged 5 to 15 years are particularly at risk: prevalence and parasite load are highest in this age group.
An antiparasitic treatment should be administered to reduce the risk of severe lesions, even if there is a likelihood of re-infection.

Geographic distribution of schistosomiasis in Africa *(WHO)*



	Parasite/Epidemiology	Clinical features/Diagnosis (established infection)	Treatment
Genito-urinary schistosomiasis	***S. haematobium*** *Distribution*: Africa, Madagascar and the Arabian peninsula	– Urinary manifestations: • In endemic areas, urinary schistosomiasis should be suspected in any patients who complain of macroscopic haematuria (red coloured urine throughout, or at the end of, micturition). Haematuria is frequently associated with polyuria/dysuria (frequent and painful micturition). • In patients, especially children and adolescents, with urinary symptoms, visual inspection of the urine (and dipstick test for microscopic haematuria if the urine appears grossly normal) is indispensible. • Presumptive treatment is recommended in the presence of macro- or microscopic haematuria, when parasitological confirmation (parasite eggs detected in urine) cannot be obtained. – Genital manifestations: In women, symptoms of genital infection (white-yellow or bloody vaginal discharge, itching, lower abdominal pain, dyspareunia) or vaginal lesions resembling genital warts or ulcerative lesions on the cervix; in men, haematospermia (blood in the semen). – If left untreated: risk of recurrent urinary tract infections, fibrosis/calcification of the bladder and ureters, bladder cancer; increased susceptibility to sexually transmitted infections and risk of infertility. – In endemic areas, genito-urinary schistosomiasis may be a differential diagnosis to the genito-urinary tuberculosis, and in women, to the sexually transmitted infections (especially in women with an history of haematuria).	The same antiparasitic treatment is used for all species: **praziquantel** PO Children > 2 years and adults[1] : 40 mg/kg as a single dose
Intestinal schistosomiasis	***S. mansoni*** *Distribution*: tropical Africa, Madagascar, the Arabian peninsula, South America (especially Brazil) ***S. japonicum*** *Distribution*: China, Indonesia, the Philippines ***S. mekongi*** *Distribution*: parts of Lao PDR, Cambodia (along the Mekong River) ***S. intercalatum*** *Distribution*: parts of DRC, Congo, Gabon, Cameroon, Chad	– Non-specific digestive symptoms (abdominal pain; diarrhoea, intermittent or chronic, with or without blood) and hepatomegaly. – For *S. intercalatum*: digestive symptoms only (rectal pain, tenesmus, rectal prolapse, bloody diarrhoea). – If left untreated: risk of hepatic fibrosis, portal hypertension, cirrhosis, gastrointestinal haemorrhage (hematemesis, melanea, etc.), except with *S. intercalatum* (less pathogenic than other intestinal schistosomes, no severe hepatic lesions). – The diagnosis is confirmed when parasite eggs are detected in stools. – In the absence of reliable parasitological diagnosis: in areas where intestinal schistosomiasis is common, diarrhoea (especially bloody diarrhoea) with abdominal pain and/or hepatomegaly may be a basis for presumptive diagnosis and treatment.	

[1] For the treatment of schistosomiasis, praziquantel may me administered to pregnant women.

Cestodes (adult forms)

Parasites	Clinical features / Laboratory	Treatment	Transmission / Prevention
Taeniasis *Taenia saginata* *Taenia solium* (worldwide)	Often asymptomatic or segments expelled in the stools. Sometimes gastrointestinal disturbances (epigastric or abdominal pain, nausea, diarrhoea) Laboratory: eggs in stools or collected from perianal skin (scotch tape method), segments in stools	**praziquantel** PO[1] Children over 4 years and adults: 5 to 10 mg/kg as a single dose or **niclosamide** PO Children: 50 mg/kg as a single dose Adults: 2 g as a single dose Thoroughly chew the tablets before swallowing and wash down with as little water as possible.	*Transmission* by eating raw or undercooked meat: • beef for *T. saginata* • pork for *T. solium* *Prevention:* • individual: cook meat thoroughly • collective: slaughterhouse monitoring
Diphyllobothriasis *Diphyllobothrium latum* (temperate or cold lake areas)	Often asymptomatic In the event of heavy infection: mild gastrointestinal disturbances, anaemia due to vitamin B_{12} deficiency associated with (rare) neurological sequelae Laboratory: eggs in stools	**praziquantel** PO[1] Children over 4 years and adults: 10 to 25 mg/kg as a single dose or **niclosamide** PO Children: 50 mg/kg as a single dose Adults: 2 g as a single dose Thoroughly chew the tablets before swallowing and wash down with as little water as possible. If anaemia: **vitamin B 12 + folic acid**	*Transmission* by eating raw or undercooked freshwater fish Individual *prevention:* cook fish thoroughly
Hymenolepiasis *Hymenolepis nana* (worldwide)	Often asymptomatic In the event of heavy infection: gastrointestinal disturbances (epigastric pain) Laboratory: eggs in stools	**praziquantel** PO[1] Children over 4 years and adults: 15 to 25 mg/kg as a single dose or **niclosamide** PO Adults: 2 g as a single dose on D1, then 1 g/day for 6 days Thoroughly chew the tablets before swallowing and wash down with as little water as possible.	*Transmission* by faecal-oral route or auto-infection *Prevention:* • individual: hand washing, nail cutting • collective: hygiene and sanitation (water, latrines, etc.)

[1] Praziquantel must be administered to pregnant women with *T. solium* taeniasis and cysticercosis. For the other indications, treatment can usually be deferred until after delivery.

Cestodes (larvae)

Parasites	Clinical features / Laboratory	Treatment	Transmission / Prevention
Cysticercosis *Taenia solium* (worldwide)	- Muscular: asymptomatic or myalgia - Subcutaneous: nodules - Neurological (neurocysticercosis) headache, convulsions, coma, etc. - Ocular: exophthalmia, strabismus, iritis, etc. Laboratory: hypereosinophilia in blood and cerebrospinal fluid	**albendazole** PO[2] Children over 2 years: 15 mg/kg/day in 2 divided doses (without exceeding 800 mg/day) for 8 to 30 days Adults: 800 mg/day in 2 divided doses for 8 to 30 days, repeat if necessary or **praziquantel** PO[3] Children over 4 years and adults: 50 mg/kg/day in 3 divided doses for 14 to 30 days In the event of *neurocysticercosis*: hospitalize, treat convulsions and combine with **prednisolone** PO for the entire duration of treatment, starting 2 or 3 days before.	*Transmission* by eating food contaminated with *T. solium* eggs or auto-infection Individual *prevention:* • treat *T. solium* carriers • hygiene • cook meat thoroughly
Hydatid cyst *Echinococcus granulosus* (South America, North, East and South Africa, Western Europe)	Cysts located in the liver (60% of cases); lungs (30% of cases), and, less frequently, in other sites including the brain. Long asymptomatic period. The cyst becomes symptomatic when complications develop (biliary obstruction; anaphylactic shock in the event of rupture into peritoneal cavity, vessels or an organ; febrile painful jaundice in the event of rupture into the biliary tree, etc.) .	First-line treatment: surgical excision **albendazole** PO[2] is useful in addition to, or instead of, surgery: Children over 2 years and adults under 60 kg: 15 mg/kg/day in 2 divided doses Adults over 60 kg: 800 mg/day in 2 divided doses Treatment duration: In addition to surgery (pre-operatively or post-operatively): continuous course of minimum 2 months or at least two 28-day courses with a drug-free interval of 14 days. Inoperable cases: 28-day courses with drug-free intervals of 14 days, for 3 to 6 months (on average), possibly up to 1 year.	*Transmission:* • direct: contact with dogs • indirect: water and food contaminated by dog faeces *Prevention:* • individual: avoid contact with dogs • collective: eliminate stray dogs, monitor slaughterhouses

[2] Albendazole is contra-indicated during the first trimester of pregnancy.
[3] Praziquantel is contra-indicated in the event of ocular cysticercosis.

Nematode infections

Infection/Epidemiology	Clinical features/Diagnosis	Treatment
Ascariasis (roundworms)[1] *Ascaris lumbricoides* *Distribution*: worldwide, mainly in tropical and subtropical *Transmission*: ingestion of ascaris eggs	– *During larval migration* Loeffler's syndrome: transient pulmonary symptoms (dry cough, dyspnoea, wheezing) and mild fever. – *Once adult worms are present in the intestine* Abdominal pain and distension. In general, the diagnosis is made when adult worms are expelled from the anus (or occasionally from the mouth). Ascaris are large (15-30 cm), cylindrical worms, pinkish-white, with slightly tapered ends. – *Complications* Ascariasis is usually benign, but massive infestation may cause intestinal obstruction (abdominal pain, vomiting, constipation), especially in children < 5 years. Worms may accidentally migrate to gall bladder, liver or peritoneum, causing jaundice, liver abscess, or peritonitis. – Ascaris eggs may be detected through parasitological examination of stools.	**albendazole** PO as a single dose Children > 6 months and adults: 400 mg (200 mg in children > 6 months but < 10 kg) or **mebendazole** PO for 3 days Children > 6 months and adults: 200 mg/day in 2 divided doses (100 mg/day in 2 divided doses in children > 6 months but < 10 kg)
Trichuriasis (whipworms)[1] *Trichuris trichiura* *Distribution and transmission*: as for *A. lumbricoides*	– In heavy infection: abdominal pain and diarrhoea – In massive infection: chronic bloody diarrhea, tenesmus, rectal prolapse due to frequent attempts to defecate, especially in children. Worms may sometimes be seen on the rectal mucosa when prolapsed: these are grayish-white, 3-5 cm in length, in the shape of a whip, with a thickened body and a long, threadlike extremity. – Trichuris eggs may be detected through parasitological examination of stools.	**albendazole** PO for 3 days Children > 6 months and adults: 400 mg once daily (200 mg once daily in children > 6 months but < 10 kg) or **mebendazole** PO for 3 days, as for ascariasis. A single dose of albendazole or mebendazole is often insufficient.
Hookworm infection[1] *Ancylostoma duodenale* *Necator americanus* *Distribution*: tropical and subtropical regions *Transmission*: larval skin penetration following contact (feet, hands) with contaminated soil	– *During larval penetration/migration* Cutaneous signs (pruritic papulo-vesicular rash at the site of penetration, usually the feet) and pulmonary symptoms (similar to ascariasis). – *Once adult worms are present in the intestine* Mild abdominal pain. Attachment of the parasite to the mucosa leads to chronic blood loss and anaemia (in endemic areas, antihelminthic treatment is recommended for patients with iron-deficiency anaemia.) – Hookworm eggs may be detected through parasitological examination of stools.	**albendazole** as a single dose (as for ascariasis) is much more effective than mebendazole as a single dose. When using **mebendazole**, a 3-day treatment (as for ascariasis) is recommended. Treatment of anaemia (see page 37).

[1] Roundworms, whipworms and hookworms frequently co-infect the same host. This should be taken into account when prescribing antihelminthic treatment.

Infection/Epidemiology	Clinical features/Diagnosis	Treatment
Strongyloidiasis *Strongyloides stercoralis* *Distribution*: humid tropical regions *Transmission*: larval skin penetration and auto-infection	– *Acute strongyloidiasis* • During larval penetration/migration: cutaneous signs (erythema and pruritus at the site of penetration, which may persist several weeks) and pulmonary symptoms (similar to ascariasis). • Once larvae are present in the intestine: gastrointestinal symptoms (bloating, abdominal and epigastric pain, vomiting, diarrhoea). – *Chronic strongyloidiasis* Intestinal larvae may re-infect their host (auto-infection) by penetrating through the intestinal wall or by migrating transcutaneously from perianal skin. Chronic infections result in prolonged or recurrent pulmonary and gastrointestinal symptoms. Transcutaneous migration of intestinal larvae gives rise to a typical rash (*larva currens*), mainly in the anal region and on the trunk: sinuous, raised, linear, migrating lesion, intensely pruritic, moving rapidly (5 to 10 cm/hour) and lasting several hours or days[2]. – *Complications* Hyperinfection (massive infestation) results in exacerbation of pulmonary and gastrointestinal symptoms, and possible dissemination of larvae to atypical locations, (CNS, heart, etc.). This form occurs mainly in patients receiving immunosuppressive therapy (e.g. corticosteroids). – Strongyloides larvae may be detected through parasitological examination of stools.	First line treatment is **ivermectine** PO[2] as a single dose: Children > 15 kg and adults: 200 micrograms/kg, on an empty stomach While less effective, a 3-day treatment with **albendazole** PO (as for trichuriasis) may be an alternative. Hyperinfections are refractory to conventional therapy. Prolonged or intermittent multiple-dose regimens are required.
Enterobiasis (pinworms) *Enterobius vermicularis* *Distribution*: worldwide *Transmission*: faecal-oral route or auto-infection	– Anal pruritus, more intense at night, vulvovaginitis in girls (rare). In practice, the diagnosis is most often made when worms are seen on the perianal skin (or in the stool in heavy infestation). Pinworms are small (1 cm), mobile, white, cylindrical worms with slightly tapered ends. – Pinworm eggs may be collected from the anal area (scotch tape method) and detected under the microscope.	**albendazole** PO as a single dose (as for ascariasis) or **mebendazole** PO as a single dose: Children > 6 months and adults: 100 mg (50 mg in children > 6 months but < 10 kg) A second dose may be given after 2 to 4 weeks.

[2] The migrating larvae of *Ancylostoma braziliense* and *caninum* (hookworms of cats and dogs) also present as a pruritic, inflammatory, creeping eruption in humans (cutaneous larva migrans) but with a slower rate of progression and a longer duration (several weeks or months). Treatment is with **albendazole** (400 mg as a single dose or once daily for 3 days in children > 6 months and adults; 200 mg in children > 6 months but < 10 kg) or **ivermectin** (200 micrograms/kg as a single dose).

Infection/Epidemiology	Clinical features/Diagnosis	Treatment
Trichinellosis *Trichinella* sp *Distribution*: worldwide, particularly frequent in Asia (Thailand, Laos, China, etc.) *Transmission*: consumption of raw or undercooked meat containing trichinella larvae (pork, wart-hog, bear, dog, etc.)	– *Enteric phase* (1 to 2 days after ingestion of infected meat) Self-limited episode of diarrhoea and abdominal pain lasting several days. – *Muscular phase* (about 1 week after ingestion) High fever; muscular pain (ocular [pain on eye movement], masseters [limitation of mouth opening], throat and neck [pain with swallowing and speech], trunk and limbs); facial or bilateral peri-orbital oedema; conjunctival haemorrhage, subungual haemorrhage; headache. Typical features are not always present and the patient may present with a non-specific flu-like syndrome. Other features, such as dietary habits (consuming pork/raw meat), suggestive symptoms (fever > 39°C and myalgia and facial oedema) in several individuals who have shared the same meal (e.g. ceremony) or hypereosinophilia > 1000/mm^3, reinforce the clinical suspicion. – Definitive diagnosis: muscle biopsy; serology (ELISA, Western Blot).	**albendazole** PO for 10 to 15 days Children > 2 years: 10 mg/kg/day in 2 divided doses Adults: 800 mg/day in 2 divided doses or **mebendazole** PO for 10 to 15 days Children > 2 years: 5 mg/kg/day in 2 divided doses Adults: 400 mg/day in 2 divided doses *plus, regardless of which antihelminthic is chosen:* **prednisolone** PO: 0.5 to 1 mg/kg/day for the duration of treatment

Filariasis

Filariases are helminthiases due to tissue-dwelling nematode worms (filariae). Human to human transmission takes place through the bite of an insect vector.

The most important pathogens are outlined in the table below. Mixed infections are common in co-endemic regions.

Each filarial species is found in 2 principal developmental stages: macrofilariae (adult worms) and microfilariae (larval offspring). The treatment depends on the pathogenic stage of the species considered and targets microfilariae for *O. volvulus* and macrofilariae for the other species.

Species /Infections	Location of macrofilariae	Location of microfilariae	Pathogenic stage	Presence of *Wolbachia*
Onchocerca volvulus (onchocerciasis)	Subcutaneous nodules	Skin and eye	Microfilariae	Yes
Loa loa (loiasis)	Subcutaneous tissue	Blood	Macrofilariae	No
Wuchereria bancrofti, ***Brugia malayi*** and ***Brugia timori*** (lymphatic filariasis)	Lymph vessels	Blood	Macrofilariae	Yes

Classical antifilarial agents include diethylcarbamazine (DEC), ivermectin and albendazole. Doxycycline is used solely in the treatment of *O. volvulus* and lymphatic filarial worms, which harbour an endosymbiotic bacterium (*Wolbachia*) sensitive to doxycycline.

Onchocerciasis (river blindness)

The distribution of onchocerciasis is linked to that of its vector (*Simulium*), which reproduces near rapidly flowing rivers in intertropical Africa (99% of cases), Latin America (Guatemala, Mexico, Ecuador, Colombia, Venezuela, Brazil) and Yemen.

Clinical features

In endemic areas, the following signs, alone or in combination, are suggestive of onchocerciasis:

– Onchocercomas: painless subcutaneous nodules containing adult worms, usually found over a bony prominence (iliac crest, trochanters, sacrum, rib cage, skull, etc.), measuring several mm or cm in size, firm, smooth, round or oval, mobile or adherent to underlying tissue; single, or multiple and clustered.
– Acute papular onchodermatitis: papular rash, sometimes diffuse but often confined to the buttocks or lower extremities, intensely itchy, associated with scratch marks,

often superinfected (« filarial scabies »)[1]. This arises from dermal invasion by microfilariae.
– Late chronic skin lesions: patchy depigmentation on the shins (« leopard skin »), skin atrophy or areas of dry, thickened, peeling skin (lichenification; "lizard skin").
– Visual disturbances and ocular lesions: see page 128.

Laboratory

– Detection of the microfilariae in the skin (skin snip biopsy, iliac crest).
– If the skin biopsy is positive, look for loiasis in regions where loiasis is co-endemic (mainly in Central Africa).

Treatment

Antiparasitic treatment

– Diethylcarbamazine is contra-indicated (risk of severe ocular lesions).
– **Doxycycline** PO (200 mg/day for 4 weeks; if possible 6 weeks) kills a significant percentage of adult worms and progressively reduces the number of *O. volvulus* microfilariae[2]. It is contra-indicated in children < 8 years and pregnant or breast-feeding women.
– **Ivermectin** PO is the drug of choice: 150 micrograms/kg as a single dose; a 2nd dose should be administered after 3 months if clinical signs persist. Repeat the treatment every 6 or 12 months to maintain the parasite load below the threshold at which clinical signs appear[3]. Ivermectin is not recommended in children < 5 years or < 15 kg and pregnant women.
– In case of co-infection with *Loa loa* or in regions where loiasis is co-endemic, ivermectin should be administered with caution (risk of severe adverse reactions in patients with high *L. loa* microfilarial load):
  • If it is possible to test for *Loa loa* (thick blood film):
    Confirm and quantify the microfilaraemia. Administer the appropriate treatment according to the microfilarial load (see *Loiasis*, page 159).
  • If it is not possible to perform a thick film examination, take a history from the patient:
    If the patient has received a previous treatment with ivermectin without developing serious adverse reactions (see page 160), administer the treatment.
    If the patient has never received ivermectin nor developed signs of loiasis (migration of an adult worm under the conjunctiva, or « Calabar » swellings), administer the treatment.
    If the patient already has developed signs of loiaisis and if onchocerciasis has a significant clinical impact, administer ivermectin under close supervision (see *Loiasis*, page 159) or use an alternative (doxycycline, as above).
– In the case of concomitant lymphatic filariasis: administer ivermectin first then start treatment for lymphatic filariasis with doxycycline PO (see page 162) one week later.

---

1 Differential diagnosis is sarcoptic scabies (page 98).
2 Elimination of *Wolbachia* reduces the longevity and fertility of the macrofilariae, and thus the production of new microfilariae within the organism.
3 Ivermectin kills microfilariae and disrupts production of microfilariae by adult worms. However the treatment must be administered at regular intervals since it does not kill adult worms.

Nodulectomy (surgical removal of onchocercomas)

Nodules are benign, often deep, and their ablation does not treat onchocerciasis. Thus, nodulectomy is reserved for cranial nodules (their proximity to the eye is a risk factor for visual compromise) or nodules which are cosmetically unacceptable. In other cases, refrain from nodulectomy. Nodulectomy is performed under local anaesthesia, in an appropriately equipped facility.

Loiasis

The distribution of loiasis is linked to that of its vector (*Chrysops*) in forests or savannah with gallery forests in West or Central Africa (limits West: Benin; East: Uganda; North: Sudan and South: Angola).

Clinical features

- The subconjunctival migration of an adult worm is pathognomonic of *Loa loa* infection.
- Localised subcutaneous swellings, allergic in origin, transient (several hours or days), painless, non-pitting, appearing anywhere on the body, frequently the upper extremities and face, often associated with localised or generalised pruritus (« Calabar swellings »).
- Onset of pruritus, in the absence of other signs.
- Subcutaneous migration of an adult worm: pruritic, palpable red cord-like linear lesion, sinuous, advancing (1 cm/hour), disappearing rapidly with no trace[4]. Such migration generally arises following treatment with diethylcarbamazine, rarely spontaneously.

Laboratory

- Detection of microfilariae in the peripheral blood (thick film, stained with Giemsa). Blood specimens should be collected between 10 am and 5 pm. Quantify microfilaraemia even if the diagnosis is certain, since treatment is determined by the intensity of the parasite load.
- If the thick film is positive, look for onchocerciasis in regions where onchocerciasis is co-endemic (mainly in Central Africa).

Treatment

Antiparasitic treatment

- Diethylcarbamazine (DEC) is the only macrofilaricide available but is contra-indicated in:
  - Patients with microfilaraemia > 2000 mf/ml (risk of severe encephalopathy, with poor prognosis).
  - Patients co-infected with *O. volvulus* (risk of severe eye lesions).
  - Pregnant women, infants, and patients in poor general condition.

4 For differential diagnosis, see cutaneous larva migrans, page 155.

– Ivermectin (and possibly albendazole) is used to reduce microfilaraemia before administration of DEC; however, ivermectin administration may trigger encephalopathy in patients with very high *Loa loa* microfilaraemia (> 30 000 mf/ml).

– Doxycycline is not indicated since *Loa loa* does not harbour *Wolbachia*.

– Management:

1) L. loa microfilaraemia is < 1,000-2,000 mf/ml:
A 28-day treatment of **DEC** may be started using small doses of 3 to 6 mg/day, i.e. 1/32 or 1/16 of a 100 mg tablet, administered in 2 divided doses. Double the dose every day up to 400 mg/day in 2 divided doses in adults (3 mg/kg/day in children).
If microfilaraemia or symptoms persist, a second treatment is given 4 weeks later.
If DEC is contra-indicated due to possible or confirmed co-infection with *O. volvulus*, **ivermectin** (150 micrograms/kg as a single dose) treats onchocerciasis, and reduces pruritus and frequency of Calabar swellings. The treatment may be repeated every month or every 3 months.

2) L. loa microfilaraemia is between 2,000 and 8,000 mf/ml:
Reduce microfilaraemia with **ivermectin** (150 micrograms/kg as a single dose); repeat the treatment every month if necessary; administer DEC when the microfilaraemia is < 2000 mf/ml.

3) L. loa microfilaraemia is between 8,000 and 30,000 mf/ml:
Treatment with **ivermectin** (150 micrograms/kg as a single dose) may cause marked functional impairment for several days. Close supervision and support from family member(s) are necessary[5]. Prescribe paracetamol as well for 7 days.

4) L. loa microfilaraemia is > 30,000 mf/ml:
- If the loiasis is well tolerated, it is preferable to refrain from treatment: the disease is benign and treatment with ivermectin may cause very severe adverse reactions (encephalopathy), albeit rarely.
- If loiasis has a significant clinical impact and/or the patient presents with symptomatic onchocerciasis requiring treatment, **ivermectin** (150 micrograms/kg as a single dose) is administered for 5 days under supervision in hospital[6]. An attempt to first reduce *L. loa* microfilaraemia using **albendazole** (400 mg/day in 2 divided doses for 3 weeks) is an option. When *L. loa* microfilaraemia is < 30 000 mf/ml, treat with ivermectin under close supervision and support, then DEC when the microfilaraemia is < 2000 mf/ml.

Extraction of macrofilariae

Subcutaneous migration of a microfilaria usually results from treatment with DEC; the worm will die beneath the skin and extracting it serves no purpose.
Removal of an adult worm from the conjunctiva: see page 128.

5 Patients may present with various pain syndromes, be unable to move without help or unable to move at all. Monitoring is necessary to determine whether the patient can manage activities of daily living, and provide assistance if necessary. If the patient remains bedridden for several days, ensure pressure sores do not develop (mobilisation, repositioning).

6 A severe reaction may occur on D2-D3. It is usually preceded by haemorrhages of the palpebral conjunctiva on D1-D2. Routinely check for this sign by turning back the eyelids. Symptoms of post-ivermectin encephalopathy are reversible and the prognosis favourable, if the patient is correctly managed; the treatment is symptomatic until symptoms resolve. Avoid the use of steroids due to adverse effects.

Lymphatic filariasis (LF)

The distribution of LF is linked to that of its mosquito vectors (*Anopheles*, *Culex*, *Aedes*, etc.):
W. bancrofti: sub-Saharan Africa, Madagascar, Egypt, India, South East Asia, Pacific region, South America, The Caribbean
B. malayi: South East Asia, China, India, Sri Lanka
B. timori: Timor
90% of LF is due to *W. bancrofti* and 10% to *Brugia* spp.

Clinical features

– Acute recurrent inflammatory manifestations
  • Adenolymphangitis: lymph node(s) and red, warm, tender oedema along the length of a lymphatic channel, with or without systemic signs (e.g. fever, nausea, vomiting). The inflammation may involve the lower limbs, external genitalia and breast.
  • In men: acute inflammation of the spermatic cord (funiculitis), epididymis and testicle (epididymo-orchitis).

  Attacks resolve spontaneously within a week and recur regularly in patients with chronic disease.

– Chronic manifestations
  • Lymphoedema: oedema of the lower extremity or external genitalia or breast, secondary to obstruction of the lymphatics by macrofilariae. The oedema is reversible initially but then becomes chronic and increasingly severe: hypertrophy of the area affected, progressive thickening of the skin (fibrous thickening with formation of creases, initially superficial, but then deep, and verrucous lesions). The final stage of lymphoedema is elephantiasis.
  • In men: increase in volume of fluid due to accumulation within the tunica vaginalis (hydrocoele, lymphocoele, chylocoele); chronic epididymo-orchitis.
  • Chyluria: milky or rice-water urine (disruption of a lymphatic vessel in the urinary tract).

  In patients parasitized by *Brugia* spp, genital lesions and chyluria are rare: lymphoedema is usually confined to below the knee.

Laboratory

– Detection of microfilariae in the peripheral blood (thick film)[7]; blood specimens should be collected between 9 pm and 3 am.
– In regions where loiasis and/or onchocerciasis are co-endemic, check for co-infection if the LF diagnosis is positive.

Treatment

Antiparasitic treatment

– Treatment is not administered during an acute attack.

[7] When test results are negative in a clinically suspect case, consider detection of antigens (ICT rapid test) and/or ultrasound of the inguinal area in search of the « filarial dance sign ».

– **Doxycycline** PO, when administered as a prolonged treatment, eliminates the majority of macrofilariae and reduces lymphoedema: 200 mg/day for 4 weeks minimum. It is contra-indicated in children < 8 years and pregnant or breast-feeding women.
– **Diethylcarbamazine** PO as a single dose (400 mg in adults; 3 mg/kg in children) may be an alternative but eliminates a variable proportion of adult worms (up to 40%) and does not relieve symptoms; a prolonged treatment is no more effective than single dose therapy. In addition, DEC is contra-indicated in patients with onchocerciasis or *Loa loa* microfilarial load > 2000 mf/ml and in pregnant and breast-feeding women.
– Ivermectin (weak or absent macrofilaricidal effect) and albendazole should not be used for the treatment of individual cases (no effect on symptoms).
– In the case of confirmed or probable co-infection with *O. volvulus*: treat onchocerciasis first (see page 157), then administer doxycycline.

Control/prevention of inflammatory manifestations and infectious complications

– Acute attacks: bed rest, elevation of the affected limb without bandaging, cooling of the affected limb (wet cloth, cold bath) and analgesics; antibacterial or antifungal cream if necessary; antipyretics if fever (paracetamol) and hydration.
– Prevention of episodes of lymphangitis and lymphoedema: hygiene of the affected extremity[8], comfortable footwear, immediate attention to secondary bacterial/fungal infections and wounds.
– Established lymphoedema: bandaging of the affected limb by day, elevation of the affected extremity (after removal of the bandage) when at rest, simple exercises (flexion-extension of the feet when recumbent or upright, rotation of the ankles); skin hygiene, as above.

Surgery

May be indicated in the treatment of chronic manifestations: advanced lymphoedema (diversion-reconstruction), hydrocoele and its complications, chyluria.

8 Wash at least once daily (soap and water at room temperature), paying special attention to folds and interdigital areas; rinse thoroughly and dry with a clean cloth; nail care.

CHAPTER 7

Bacterial diseases

Bacterial meningitis 165

Tetanus 170

Typhoid fever 174

Brucellosis 176

Plague 178

Leptospirosis 180

Relapsing fever (borreliosis) 182

Eruptive rickettsioses 185

Bacterial meningitis

Meningitis is an acute bacterial infection of the meninges, which may affect the brain and lead to irreversible neurological damage and auditory impairment.
Bacterial meningitis is a medical emergency. The treatment is based on early parenteral administration of antibiotics that penetrates well into the cerebrospinal fluid. Empiric antibiotic therapy is administered if the pathogen cannot be identified or while waiting for laboratory results.

The main bacteria responsible vary depending on age and/or context:

– Meningitis in a non-epidemic context:
  • Children 0 to 3 months:
    Children ≤ 7 days: Gram-negative bacilli (*Klebsiella* spp, *E. coli*, *S. marscesens*, *Pseudomona* spp, *Salmonella* spp) and group B streptococcus
    Children > 7 days: *S. pneumoniae* accounts for 50% of all bacterial meningitis.
    L. monocytogenes is occasionally responsible for meningitis during this period.
  • Children 3 months-5 years: *S. pneumoniae*, *H. influenza B* and *N. meningitidis*
  • Children > 5 years and adults: *S. pneumoniae* and *N. meningitidis*

  Special conditions:
  • Immunodepressed patients (HIV, malnourished): high percentage of Gram-negative bacilli (specially *Salmonella* spp) and also *M. tuberculosis*.
  • Sickle cell anaemia: *Salmonella* spp and *Staphylococcus aureus* are frequent causes.
  • Meningitis may be related to *S. aureus* when associated with skin infection or skull fracture.

– Meningitis in an epidemic context:[1]
  In the Sahelian region[1] during the dry season, epidemics of meningococcal meningitis (*Neisseria meningitidis* A or C or W135) affect children from 6 months of age, adolescents and adults. In these regions, whether during epidemics or not, all the above pathogens can be found, especially in young children.

Clinical features

The clinical presentation depends on the patient's age:

Children over 1 year and adults

– Fever, severe headache, photophobia, neck stiffness
– Brudzinski's sign (neck flexion in a supine patient results in involuntary flexion of the knees) and Kernig's sign (attempts to extend the knee from the flexed-thigh position are met with strong passive resistance).
– Petechial or ecchymotic purpura (usually in meningococcal infections)
– In severe forms: coma, seizures, focal signs, purpura fulminans

1 But not exclusively, e.g. Rwanda, Angola, Brazil

Children under 1 year

The classic signs of meningitis are usually absent.
– The child is irritable, appears sick with fever or hypothermia, poor feeding or vomiting.
– Other features include: seizures, apnoea, altered consciousness, bulging fontanelle (when not crying); occasionally, neck stiffness and purpuric rash.

Laboratory

– Lumbar puncture (LP):
  • Macroscopic examination of the cerebrospinal fluid (CSF): antibiotic therapy should be initiated immediately if the LP yields a turbid CSF.
  • Microscopic examination: Gram stain (but a negative examination does not exclude the diagnosis) and white blood cell count (WBC).
  • In an epidemic context, once the meningococcal aetiology has been confirmed, there is no need for routine LP for new cases.

	Pressure	**Aspect**	**WBC** (leucocytes/mm^3)	**Protein**	**Other tests**
Normal CSF		Clear	< 5	Pandy – < 40 mg/dl	–
Bacterial meningitis	++++	Cloudy, turbid	100-20 000 mainly neutrophiles In neonates: > 20 In immunocompromised the WBC may be < 100	Pandy + 100-500 mg/dl	Gram stain +
Viral meningitis	Normal to +	Clear	10-700 mainly lymphocytes	Pandy –	–
TB meningitis	+++	Clear or yellowish	< 500 mainly lymphocytes	Pandy +	AFB
Cryptococcal meningitis	++++	Clear	< 800 mainly lymphocytes	Pandy –	India ink

– Rapid test for detection of bacterial antigens.

Note: in an endemic area, it is essential to test for severe malaria (rapid test or thin/thick films).

Treatment in a non-epidemic context

Antibiotic therapy

For the choice of antibiotic therapy and dosages according to age, see following page 169.

Duration of antibiotic therapy:

1) According to the pathogen:
   - *Haemophilus influenzae*: 7 days
   - *Streptococcus pneumoniae*: 10-14 days
   - *Group B streptococcus* and *Listeria*: 14-21 days
   - *Gram-negative bacilli*: 21 days
   - *Neisseria meningitidis*: see *Antibiotic therapy in an epidemic context*

2) If the pathogen is unknown:
   Children < 3 months: 2 weeks beyond the first sterile CSF culture or 21 days
   Children > 3 months and adults: 10 days. Consider extending treatment or alternative diagnoses if fever persists beyond 10 days. On the other hand, a 7-day course of ceftriaxone is sufficient in patients who are making an uncomplicated recovery.

Additional treatment

– Dexamethasone reduces the risk of hearing loss in patients with *H. influenzae* or *S. pneumoniae*. Early administration in indicated in meningitis caused by these pathogens or when the pathogen is unknown, except in neonates (and in presumed meningococcal meningitis in an epidemic context).
  dexamethasone IV:
  Children > 1 month and adults: 0.15 mg/kg (max. 10 mg) every 6 hours for 2 days. The treatment should be started before or with the first dose of antibiotic, otherwise, the treatment offers no benefit.

– Ensure that the patient is well fed and well hydrated (infusions or nasogastric tube if necessary).

– Seizures: see page 23.

– Coma: prevention of bed sores, care of the mouth and eyes, etc.

Treatment in an epidemic context [2]

Antibiotic therapy

In this context, *N. meningitidis* is the most likely pathogen. First-line treatment (in out-patients) is either oily chloramphenicol or ceftriaxone administered as a single IM dose.

1 Refer to the MSF handbook *Management of epidemic meningococcal meningitis*.

Children over 2 years and adults (except for pregnant or breast-feeding women)

oily chloramphenicol IM: 100 mg/kg as a single dose without exceeding 3 g. Divide the dose into two injections if needed, half-dose in each buttock. Do not exceed indicated doses.

Age	2-5 years	6-9 years	10-14 years	≥15 years
Dose	1.5 g	2 g	2.5 g	3 g

or
ceftriaxone IM: 100 mg/kg as a single dose, maximum 4 g. Divide the dose into two injections if needed, half-dose in each buttock.

Age	2-5 years	6-9 years	10-14 years	≥15 years
Dose	1.5 g	2.5 g	3 g	4 g

If there is no clinical improvement (i.e. repeated convulsions, fever > 38.5°C, appearance or aggravation of a reduced level of consciousness or of neurological signs) 24 hours after the first injection: administer a second dose of the same antibiotic.
If there is no clinical improvement (same signs as above) 48 hours after beginning the treatment (i.e. after two consecutive doses of oily chloramphenicol or ceftriaxone administered at 24-hour interval), review the diagnosis. If no other diagnosis has been found (e.g. malaria), continue the treatment with ceftriaxone once daily for 5 days.

Children less than 2 years

The treatment depends on the most probable pathogen and the patient's age, as for meningitis in non-epidemic context (see page 169).

Pregnant or breast-feeding women

ceftriaxone IM: 100 mg/kg as a single dose, maximum 4 g
or **ampicilline** IV at the doses indicated page 169
Oily chloramphenicol is contra-indicated.

Additional treatment

- Ensure that the patient is well fed and well hydrated (infusions or nasogastric tube if necessary).
- Seizures: see page XX.
- Coma: prevention of bed sores, care of the mouth and eyes, etc.
- Dexamethasone in not indicated.

	No associated skin infection		Associated skin infection (including umbilical cord infection)	
	First choice	Alternative	First choice	Alternative
1 month – 0-7 days	**ampicillin** IV 150 mg/kg/day in 3 injections + **cefotaxime** IV 100-150 mg/kg/day in 2 injections	**ampicillin** IV 150 mg/kg/day in 3 injections + **gentamicin** IV 5 mg/kg/day in 2 injections	**cloxacillin** IV 75 mg/kg/day in 2 injections + **cefotaxime** IV 100-150 mg/kg/day in 2 injections	**cloxacillin** IV 75 mg/kg/day in 2 injections + **gentamicin** IV 5 mg/kg/day in 2 injections
1 month – 8-28 days	**ampicillin** IV 200 mg/kg/day in 3 injections + **cefotaxime** IV 150-200 mg/kg/day in 3 injections	**ampicillin** IV 200 mg/kg/day in 3 injections + **gentamicin** IV 7.5 mg/kg/day in 3 injections	**cloxacillin** IV 200 mg/kg/day in 3 injections + **cefotaxime** IV 150-200 mg/kg/day in 3 injections	**cloxacillin** IV 200 mg/kg/day in 3 injections + **gentamicin** IV 7.5 mg/kg/day in 3 injections
1 to 3 months	**ampicillin** IV 200-300 mg/kg/day in 3 injections + **ceftriaxone** IV 100 mg/kg once daily	**ampicillin** IV 200-300 mg/kg/day in 3 injections + **gentamicin** IV 7.5 mg/kg once daily	**cloxacillin** IV 200 mg/kg/day in 3 injections + **ceftriaxone** IV 100 mg/kg once daily	**cloxacillin** IV 200 mg/kg/day in 3 injections + **gentamicin** IV 7.5 mg/kg once daily
3 months to 5 years	**ceftriaxone** IV 100 mg/kg once daily	–	**cloxacillin** IV 200 mg/kg/day in 3 injections + **ceftriaxone** IV 100 mg/kg once daily	–
> 5 years and adults	**ceftriaxone** IV 100 mg/kg once daily 2 g/day in adults	**ampicillin** IV 200-300 mg/kg/day in 3 injections 12 g/day in adults	**cloxacillin** IV 200 mg/kg/day in 3 injections 6 g/day in adults + **ceftriaxone** IV 100 mg/kg once daily 2 g/day in adults	–

Tetanus

Tetanus is a severe infection due to the bacillus *Clostridium tetani*, which is found in soil, and human and animal waste. The infection is not communicable. *C. tetani* is introduced into the body through a wound and produces a toxin whose action on the central nervous system is responsible for the symptoms of tetanus.
Tetanus is completely preventable through vaccination. In unvaccinated individuals, most breaks in the skin or mucous membranes carry a risk of tetanus, but the wounds with the greatest risk are: umbilical cord stump in newborns, operative sites in surgical or obstetrical procedures performed under non-sterile conditions, puncture wounds, wounds with tissue loss or contamination with foreign material or soil, avulsion and crush injuries, sites of non-sterile injections, chronic wounds (e.g. lower extremity ulcers), burns and bites.
Tetanus develops in persons who have not been correctly vaccinated before exposure, or have not received adequate prophylactic treatment immediately after exposure.

Clinical features

Generalised tetanus is the most frequent and severe form of the infection. It presents as muscular rigidity, which progresses rapidly to involve the entire body, and paroxysmal muscle spasms, which are very painful. Level of consciousness is not altered.

Children and adults

- Average period from exposure to onset of symptoms is 7 days (3 to 21 days)
- Muscular rigidity is first seen in the jaw muscles (difficulty, then inability, in opening the mouth [trismus], preventing the patient from speaking, eating) then, extends to those of the face (fixed smile [risus sardonicus]), the neck (difficulty in swallowing), trunk (restriction of respiratory muscles; hyperextension [opisthotonos]), abdomen (guarding) and limbs (extension of the lower limbs and flexion of the upper limbs).
- Muscle spasms appear at the onset or when muscular rigidity becomes generalised. They are triggered by stimuli or arise spontaneously. Spasms of the thoracic and laryngeal muscles may cause respiratory distress or aspiration.

Newborns

- In 90% of cases, initial symptoms appear within 3 to 14 days of birth.
- The first signs are significant irritability and sucking difficulties (rigidity of the lips, trismus), then rigidity becomes generalised, as in adults. An infant qualifies as a *case of neonatal tetanus* if it has sucked and cried normally for the first 2 days of life, then becomes irritable and stops sucking 3 to 28 days after birth, and demonstrates rigidity and muscle spasms.
- Although the umbilicus is almost always the portal of entry, clinical infection of the cord site (omphalitis) is evident in only one half of cases.
- Check for septicaemia, which is frequently associated.

Treatment

Hospitalisation is necessary and requires 3 to 4 weeks on average. Correct management can reduce mortality by 50%, even in hospitals with limited resources.

General measures

- The patient should be the sole occupant of a dark, quiet room: all stimulation (noise, light, touch) may trigger painful spasms that may cause critical respiratory distress.
- Handle the patient very carefully, under sedation and as little as possible; reposition every 3 to 4 hours to prevent bedsores.
- Establish IV access: hydration, access for IV injections.
- Insert a nasogastric tube: hydration and feeding; administration of oral medications.
- Gentle aspiration of secretions (nose, oropharynx).
- Provide hydration and nutrition in feeds divided over 24 hours. In newborns, give expressed breast milk every hour (risk of hypoglycaemia).

Neutralisation of toxin

human tetanus immunoglobulin IM
Newborns, children and adults: 500 IU as a single dose, injected into 2 separate sites

Inhibition of toxin production

The treatment of choice is **metronidazole** IV for 7 days[1] (administered over 60 min in newborns):
Newborns: one dose of 15 mg/kg then, after 24 hours, 7.5 mg/kg every 12 hours
Children: 7.5 mg/kg every 8 hours
Adults: 500 mg every 8 hours

Control of rigidity and spasms, and sedation of the patient

⚠ Due to increased risk of respiratory depression/arrest when using high doses of diazepam, the patient must always be kept under constant close observation, with immediate availability of equipment required for intubation and manual ventilation.
The dose and frequency of administration depend on the patient's clinical response and tolerance (monitor respiratory rate or oxygen saturation).

diazepam
For IV as well as for intra-rectal administration[2], dilute 2 ml of diazepam (10 mg) in 8 ml of 5% glucose or 0.9% sodium chloride.
Children: 0.1 to 0.3 mg/kg by slow IV injection (over 3 to 5 minutes) or 0.5 mg/kg by rectal route, without exceeding 10 mg per dose, to be repeated every 1 to 4 hours
Adults: 10 mg by slow IV or intra-rectal route

---

1 **Benzylpenicillin** IV for 10 to 14 days may be an alternative (second choice):
Newborns: 80,000 IU/kg/day (50 mg/kg/day) in 2 injections every 12 hours
Infants: 125,000 IU/kg/day (75 mg/kg/day) in 3 injections every 8 hours
Children: 200,000 to 400,000 IU/kg/day (120 to 240 mg/kg/day) in 4 injections every 6 hours
Adults: 10 MIU/day (6 g/day) in 4 injections every 6 hours
Change to the oral route when possible with **phenoxymethylpenicillin** (**penicillin V**) by nasogastric tube.
Children: 62.5 mg/kg/day in 4 doses; adults: 2 g/day in 4 doses.

2 For rectal administration, use a syringe without needle or cut a nasogastric tube, CH8, to a length of 2-3 cm and attach it to the tip of the syringe.

In the case of severe spasms not controlled by intermittent dosing, diazepam may be administered by continuous IV infusion (except in infants less than 1 month), under constant close observation.
Children over 1 month and adults: 3 to 10 mg/kg/day, the dose is to be adjusted according to clinical response.

Control of pain

In early stage, if necessary; the risk of respiratory depression is increased, thus closer monitoring is required:
morphine slow IV (5 minutes)
Newborns: 0.05 mg/kg every 6 hours if needed
Children from 1 to 6 months: 0.1 mg/kg every 6 hours if needed
Children over 6 months and adults: 0.1 mg/kg every 4 hours if needed

Treatment of the entry site

A systematic search should be made for the entry wound. Provide local treatment under sedation: cleansing, and for deep wounds, irrigation, debridement.
Cord infection: do not excise or debride; treat bacterial omphalitis.

Tetanus vaccination

As tetanus does not confer immunity, vaccination against tetanus must be administered once the patient has recovered.
In case of neonatal tetanus, initiate the vaccination of the mother.

Prevention

Of critical importance, given the difficulty of treating tetanus once established.

1) Post-exposure prophylaxis

– In all cases:
  • Cleansing and disinfection of the wound, and elimination of foreign material.
  • Antibiotics are not prescribed routinely for prophylaxis. The decision to administer an antibiotic (metronidazole or penicillin) is made on a case-by-case basis, according to the patient's clinical status.
– Depending on pre-exposure vaccination status:
  • tetanus vaccine (TV)[3] and immunoglobulin: see indications below.

Risk	**Complete vaccination** (3 or more doses) Time since administration of latest dose: < 5 years	5-10 years	> 10 years	**Incomplete vaccination** (less than 3 doses) or **no vaccination** or **unknown status**
Minor clean wound	None	None	TV one booster dose	Initiate or complete TV
All other wounds	None	TV one booster dose	TV one booster dose	Initiate or complete TV and Administer tetanus immunoglobulin

[3] Tetanus-containing vaccine, such as TT or DT or dT or DTP or DTP + HepB or DTP + Hib + HepB according to availability and patient's age.

tetanus vaccine IM
Children and adults: 0.5 ml/injection
With no vaccination or unknown vaccination status: administer at least 2 doses at an interval of 4 weeks.
With incomplete vaccination: administer one dose.
Then, to ensure long-lasting protection, administer additional doses to complete the total 5 doses, as indicated in the table below.

human anti-tetanus immunoglobulin IM
Children and adults: 250 IU as a single dose; 500 IU for wounds more than 24 hours old.
Inject the vaccine and the immunoglobulin in 2 different sites, using a separate syringe for each.

2) Routine vaccination (pre-exposure prophylaxis)

– Children: 5 doses in total: a first series of 3 doses of DTP or DTP + HepB or DTP + Hib + HepB before the age of 1 year, administered at an interval of 1 month (e.g. at the age of 6, 10 and 14 weeks), then a 4th dose of a vaccine containing tetanus toxoid between the ages of 4 to 7 years, then a 5th dose between 12 and 15 years.
– Women of childbearing age: 5 doses during the reproductive years: a series of 3 doses (dT or TT) with an interval of at least one month between the 1st and 2nd dose and an interval of at least 6 months between the 2nd and 3rd dose, then two other doses, each at minimum interval of one year, e.g. during pregnancies (see table below).
– Pregnant women: if a woman has never been vaccinated or if her vaccination status is unknown: 2 doses of dT or TT during the pregnancy to reduce the risk of tetanus in mother and newborn: the first as soon as possible during the pregnancy and the second at least 4 weeks later and at least 2 weeks before delivery. This vaccination regime protects more than 80% of newborns from neonatal tetanus. A single dose offers no protection. Continue vaccination after delivery to complete 5 doses, as for women of childbearing age.

Dose	Vaccination schedule in adults	Degree and duration of protection
TV1	On first contact with the health care system or as soon as possible during pregnancy	No protection
TV2	At least 4 weeks after TV1	80% 1 to 3 years
TV3	6 months to 1 year after TV2 or during the following pregnancy	95% 5 years
TV4	1 to 5 years after TV3 or during the following pregnancy	99% 10 years
TV5	1 to 10 years after TV4 or during the following pregnancy	99% Throughout the reproductive years

3) Other measures

Appropriate hygiene during delivery, including home birth.

Typhoid fever

– Systemic infection due to *Salmonella typhi*. The organism enters the body via the gastrointestinal tract and gains access to the bloodstream via the lymphatic system.
– Typhoid fever is acquired by ingestion of contaminated water and food or by direct contact (dirty hands).

Clinical features

– Sustained fever (lasting more than one week), headache, asthenia, insomnia, anorexia, epistaxis.
– Abdominal pain or tenderness, diarrhoea or constipation, gurgles.
– Toxic confusional state, prostration.
– Moderate splenomegaly, relative bradycardia (normal pulse despite fever).

– *Differential diagnosis* may be difficult as symptoms resemble those of lower respiratory tract infections, urinary infections, and malaria or dengue fever in endemic areas.
– *Complications* can occur during the active phase or during convalescence (even during treatment): intestinal perforation or haemorrhage, peritonitis, myocarditis, encephalitis, coma.

Laboratory

– Relative leukopenia (normal white blood cell count despite septicaemia).
– Isolation of *S. typhi* from blood cultures (take at least 10 ml of blood) and stool cultures during the first 2 weeks.
– Widal's agglutination reaction is not used (both sensitivity and specificity are poor).

Treatment (at hospital level)

– Isolate the patient.

– Keep under close surveillance, hydrate, treat fever (see *Fever*, page 26).

– Antibiotic therapy: case-fatality rates of 10% can be reduced to less than 1% with early antibiotic treatment based on the findings of blood cultures. The oral route is more effective than the parenteral route. If the patient cannot take oral treatment, start by injectable route and change to oral route as soon as possible.

Antibiotic treatment (except during pregnancy or breast-feeding)

- The treatment of choice is: **ciprofloxacin** PO for 5 to 7 days
  Children: 30 mg/kg/day in 2 divided doses (usually not recommended in children under 15 years, however, the life-threatening risk of typhoid outweighs the risk of adverse effects)
  Adults: 1 g/day in 2 divided doses

cefixime PO for 7 days may be an alternative to ciprofloxacine in children under 15 years:
Children over 3 months: 15 to 20 mg/kg/day in 2 divided doses

Failing that, and in the absence of resistance:
amoxicillin PO for 14 days
Children: 75 to 100 mg/kg/day in 3 divided doses
Adults: 3 g/day in 3 divided doses
or
chloramphenicol PO for 10 to 14 days depending on severity
Children: 100 mg/kg/day in 3 divided doses
Adults: 3 g/day in 3 divided doses

- S. *typhi* is rapidly developing resistance to quinolones. In this event, use:
  ceftriaxone IM or IV[1] for 10 to 14 days depending on severity
  Children: 75 mg/kg once daily
  Adults: 2 to 4 g once daily

Antibiotic treatment in pregnant or breast-feeding women

In pregnant women, typhoid carries a major risk of maternal complications (intestinal perforation, peritonitis, septicaemia) and foetal complications (miscarriage, premature delivery, intrauterine death).

- In the absence of resistance:
  amoxicillin PO: 3 g/day in 3 divided doses for 14 days
- If resistance:
  ceftriaxone IM or IV[1]: 2 to 4 g once daily for 10 to 14 days depending on severity
  Failing that, use **ciprofloxacin** PO (usually not recommended for pregnant or breast-feeding women. However, the life-threatening risk of typhoid outweighs the risk of adverse effects). For dosage, see above.

Note: fever persists for 4 to 5 days after the start of treatment, even if the antibiotic is effective. It is essential to treat the fever and to check for possible maternal or foetal complications.

– In patients presenting severe typhoid, with toxic confusional state (hallucinations, altered consciousness) or intestinal haemorrhage:
dexamethasone IV: loading dose 3 mg/kg and then 1 mg/kg every 6 hours for 2 days

Prevention

– Disinfection of faeces with 2% chlorine solution.

– Individual (hand washing) and collective hygiene (safe water supply, sanitation).

– The possibility of vaccination must be considered: it can be useful in some situations (high-risk age group, hyperendemic zone), but its effectiveness remains controversial.

[1] The solvent of ceftriaxone for IM injection contains lidocaine. Ceftriaxone reconstituted using this solvent must NEVER be administered by IV route. For IV administration, water for injection must always be used.

Brucellosis

– A zoonosis that mainly affects domestic animals. It is occasionally transmitted to man by ingestion of infected raw milk, or by contact (with infected animals or with soiled objects through abrasion on the skin). Human-to-human transmission is rare.
– Brucellosis is caused by Gram-negative bacilli of the genus *Brucella*: *B. melitensis* (sheep and goats), *B. abortus* (cattle), *B. suis* (pigs) and less commonly, *B. canis* and *B. ovis*.
– The disease is found worldwide and mainly in rural areas. The true incidence of brucellosis in tropical countries is probably underestimated as it is often undiagnosed.

Clinical features

The clinical signs and associated symptoms are fluctuating and non specific. Diagnosis is difficult because of the broad spectrum of clinical manifestations.

Acute form

– Common form: gradual onset over one to 2 weeks: undulant fever (up to 39-40°C) lasting 10 to 15 days, night sweats, chills, asthenia, joint and muscle pain. Possible sacroileitis, arthritis (knee) and orchitis.
  In regions where malaria is endemic, the possibility of acute brucellosis should be considered when a high fever persists despite correct anti-malarial treatment.
– Other clinical forms:
  • Typhoid-like form: sudden onset with signs of septicaemia; high fever, typhoid state, delirium, abdominal signs.
  • Subacute form: mild, non-specific clinical signs that do not lead the patient to seek medical attention. Serum test positive.

Secondary brucellosis

Prolonged asthenia, focal signs:
– Bone and joint involvement: arthritis of the hip, sacroileitis, spondylitis with sciatalgia (pseudo-Pott's disease).
– Neurobrucellosis: pseudo-tuberculosis meningitis, meningoencephalitis; a complication at vertebral site involving peripheral nerves may cause motor and/or sensory disorders.

Chronic brucellosis

– General signs; physical and mental asthenia, sweating and polyalgia.
– Focal signs: slow developing bone, neuromeningeal or visceral foci.

Laboratory

– During the acute phase diagnosis can be confirmed by the detection of the pathogen in a blood culture.
– The Rose Bengal test (or card test) can identify specific antibodies. It is a quick, cheap and both specific and sensitive test for the diagnosis of acute and localized forms of brucellosis.

– Other serological tests (Wright's test, ELISA, indirect immunfluorescence and Coombs'test) cannot usually be done.

Treatment

Treatment is based on a combination of 2 antibiotics. Since streptomycin and rifampicin are also used in the treatment of tuberculosis, it is essential to rule out the possibility of active TB before starting treatment (patient history, clinical examination and chest X-ray if possible). Rifampicin must only be used when indicated below.

Acute form

– Children over 8 years and adults (except in pregnant or breast-feeding women):
doxycycline PO
Children: 100 to 200 mg once daily or in 2 divided doses for 6 weeks
Adults: 200 mg once daily or in 2 divided doses for 6 weeks
+ **streptomycin** IM
Children: 15 mg/kg once daily for 2 weeks
Adults: 1 g once daily for 2 weeks

– Children under 8 years
cotrimoxazole PO: 40 mg SMX + 8 mg TMP/kg/day in 2 divided doses for 6 weeks
+ **gentamicin** IM: 7.5 mg/kg once daily or in 2 divided doses for 2 weeks
or **rifampicin** PO: 15 mg/kg once daily for 6 weeks

– Pregnant or breast-feeding women
cotrimoxazole PO: 1600 mg SMX + 320 mg TMP/day in 2 divided doses for 6 weeks
+ **rifampicin** PO: 600 mg once daily for 6 weeks
Note:
In pregnant women, the combination of cotrimoxazole + rifampicin can be administered regardless of the stage of pregnancy if treatment is indispensable.
Administration of vitamin K is recommended to prevent neonatal and maternal haemorrhage.
phytomenadione (vial containing 10 mg/ml, 1 ml):
To the mother: 10 mg/day PO for the 15 days preceding the expected date of delivery
To the newborn: 2 mg PO as a single dose at birth and again after 4 to 7 days

Focal brucellosis

– Same treatment regimen as for the acute form, but for a period of 6 weeks to 3 months depending on severity. Surgical draining of an abscess of the liver or spleen may be indicated.
– Neurobrucellosis or endocarditis: combination of **rifampicin** + **doxycycline** + **gentamicin**.
Antibiotic treatment is not effective in the context of chronic, non-focal brucellosis.

Prevention

– Washing of hands and clothing if in contact with animals.
– Boil milk and avoid eating raw cheese and undercooked meat.

Plague

– A zoonosis caused by the Gram-negative bacillus *Yersinia pestis* that mainly affects wild and domestic rodents.
– Plague is transmitted to man by the bite of an infected flea vector or through a break in the skin by contact with a rodent. Human-to-human transmission occurs through the bites of human fleas, or, in the case of pneumonic plague, by inhaling infected droplets expelled by coughing.
– Vast foci of infection remain in Central and Southeast Asia, Africa, Madagascar, and in North and South America.

Clinical features and progress

There are 3 main clinical forms:

– *Bubonic plague* is the most common form: high fever, chills, headache, associated with one (or more) very painful lymph node, usually inguinal (bubo). Frequent gastrointestinal signs: abdominal pain, vomiting, diarrhoea, etc. The mortality rate in untreated patients is approximately 50% as a result of septicaemia.
– *Septicaemic plague* is a complication of untreated bubonic plague and is a fulminant illness.
– *Pneumonic plague* is a very contagious form: high fever, chills, headache, myalgia associated with paroxysmal coughing, haemoptysis and respiratory distress. This form progresses rapidly, and is fatal unless treated. It occurs either as a complication of bubonic plague or as the result of a primary infection.

Occasionally, the disease can take the form of *meningitic plague*.

Laboratory

– Isolation of *Y. pestis* (direct examination and culture) from lymph node aspirate, blood, sputum, cerebrospinal fluid, depending on the form involved.
– Serodiagnosis: ELISA reads positive soon after the onset of the illness.
– Transportation of the samples requires a cold chain (failing that, the temperature must be kept below 30°C).

Management and treatment

– When plague is suspected: take samples for cultures and antibiotic sensitivity testing and then treat immediately without waiting for the diagnosis to be confirmed. Inform the health authorities as soon as the diagnosis has been confirmed.

– Isolation:
  • Patients suffering from bubonic plague do not have to be isolated. Treat the patient and his/her bedding and clothing with an insecticide (e.g. **permethrin 0.5%** powder; see *Pediculoses*, page 101). Observe elementary rules of hygiene (wash hands, wear gowns, gloves etc.).
  • Patients with primary or secondary pneumonic plague must be strictly isolated. Their bedding, clothing, sputum and excreta must be disinfected with a chlorinated solution. Observe elementary rules of hygiene (wash hands, wear hospital lab coats, gloves etc.) and both the patient and carers should wear facemasks.

– ***Treatment of suspected or confirmed cases***

If treatment is begun early, recovery is rapid and complete. Penicillins, cephalosporins and macrolides should not be used.
Aminoglycosides, tetracyclines, chloramphenicol and sulphonamides are effective. Follow national recommendations. For information:

streptomycin IM for 10 days
Children: 30 mg/kg/day in 2 divided doses given at 12 hour-intervals
Adults: 2 g/day in 2 divided doses given at 12 hour-intervals

gentamicin IM for 10 days
Neonates and children under one year: 7.5 mg/kg/day in 2 divided doses
Children over one year: 6 mg/kg/day in 2 divided doses
Adults: 3 mg/kg/day in 2 divided doses

doxycycline PO for 10 days
Children over 8 years and adults: 200 mg/day, once daily or in 2 divided doses

chloramphenicol PO or IV for 10 days
Children over one year and adults: 50 mg/kg/day in 4 divided doses given at 6 hour-intervals

Choice of antibiotics

Indications	First choice	Alternative
Bubonic plague	doxycycline	chloramphenicol or streptomycin
Pneumonic plague	streptomycin	–
Septicaemic plague	streptomycin	chloramphenicol
Meningitic plague	chloramphenicol	–
Pregnant or breast-feeding women	gentamicin	–

Note: in order to prevent the emergence of resistance to streptomycin which is used in the treatment of tuberculosis, it is preferable to use doxycycline or chloramphenicol for the treatment of bubonic plague.

– ***Chemoprophylaxis of contacts***

In the event of contact, and within one week after the end of exposure:
doxycycline PO throughout the period of contact (minimum 5 days of treatment)
Children over 8 years and adults: 100 to 200 mg/day, once daily or in 2 divided doses
or
co-trimoxazole PO throughout the period of contact (minimum 5 days of treatment)
Children: 40 mg SMX + 8 mg TMP/kg/day in 2 divided doses
Adults: 1600 mg SMX + 320 mg TMP/day in 2 divided doses

Prevention

– Flea vector control is essential to controlling an epidemic.
– Long-term prevention: environmental sanitation and control of rodent reservoir.
– Vaccination against plague is only indicated for people with a high risk of exposure (laboratory technicians handling rodents) and can in no circumstances be used as a method for controlling an epidemic.

Leptospirosis

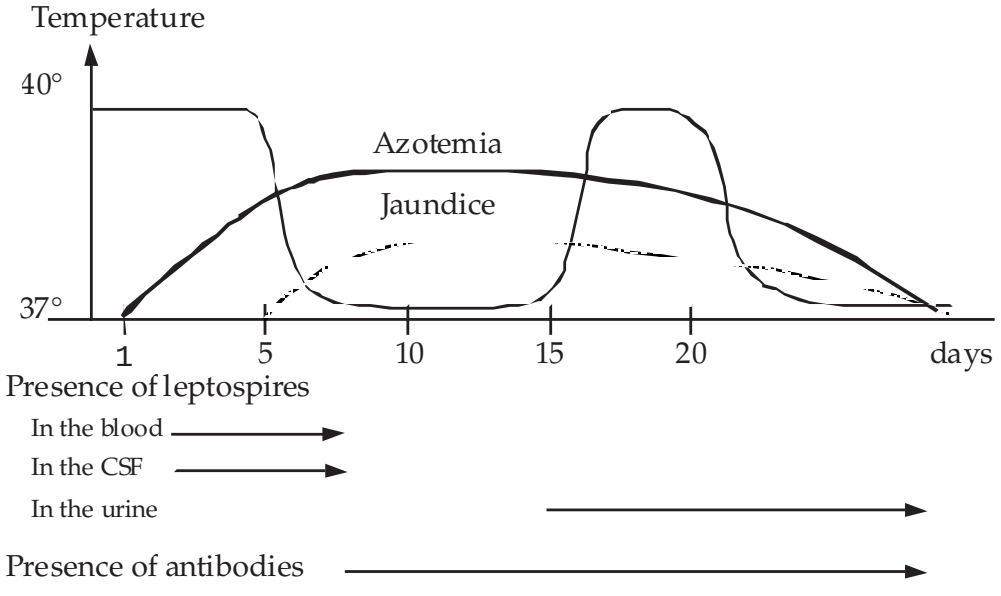
– A zoonosis caused by spirochetes of the genus *Leptospira*, affecting many domestic and wild animals (particularly rodents and principally rats).
– Leptospirosis is acquired by indirect contact (contact of the skin or mucous membranes with animal urine-contaminated water, e.g. when swimming) and less commonly, by direct contact with infected animals.

Clinical features

Diagnosis is difficult because of the broad spectrum of clinical manifestations. A distinction is usually made between the mild form (the most common, usually with a favourable outcome) and the severe form (multiple organ dysfunction syndrome).

– **Mild form**
  • After an incubation period of one to 3 weeks: influenza-like illness (high fever, chills, headache, myalgias), often combined with gastrointestinal disorders (anorexia, abdominal pain, nausea, vomiting) and possible pulmonary signs (cough, chest pain). Other signs: conjunctival haemorrhage, hepatosplenomegaly, and multiple adenopathies. Mild jaundice may be present, but this form is usually anicteric.
  • The signs regress after 5 to 6 days, and then reappear, sometimes with meningeal invasion, which may be complicated by encephalitis or myelitis.
– **Severe form or Weil's syndrome**
  The onset of the disease is the same as in mild form. After a few days, acute hepatorenal manifestations with fever, jaundice, oligo-anuric renal failure; diffuse haemorrhagic syndrome (purpura, ecchymoses, epistaxis etc.), pulmonary signs (cough, chest pain, haemoptysis) and cardiac signs (myocarditis, pericarditis).

Temperature chart and progress of leptospirosis



Laboratory

– Isolation through culture of leptospires from blood, cerebrospinal fluid (during the first phase) or urine (during the second phase).
– Serodiagnosis: immunofluorescence or ELISA (antibodies are detected from Day 8).
– Blood cell count: polymorphonuclear leukocytosis.
– If meningeal syndrome: lumbar puncture yields a clear fluid, usually with raised leucocyte count and elevated protein level (about 1 g/litre).
– Urine: proteinuria, leukocyturia, possible haematuria and presence of casts.

Treatment

– Rest and treatment of fever: **paracetamol** PO (see *Fever*, page 26).
Acetylsalicylic acid (aspirin) is contraindicated (risk of haemorrhage).

– Antibiotic treatment should be started as soon as possible:

• *Moderate form*
amoxicillin PO
Children: 50 mg/kg/day in 2 or 3 divided doses for 7 days
Adults: 2 g/day in 2 or 3 divided doses for 7 days
or
doxycycline PO (except in pregnant or breast-feeding women and children under 8 years)
Children over 8 years: 100 mg/day in 2 divided doses for 7 days
Adults: 200 mg/day in 2 divided doses for 7 days
or
erythromycin PO
Children: 50 mg/kg/day in 2 or 3 divided doses for 7 days
Adults: 2 to 3 g/day in 2 or 3 divided doses for 7 days

• *Severe form*
ampicillin IV
Children: 100 mg/kg/day in 3 injections
Adults: 4 to 6 g/day in 3 injections
Switch to the oral route as soon as possible, with **amoxicillin** to complete 7 days of treatment.
or
erythromycin IV
Children: 50 mg/kg/day in 3 or 4 injections
Adults: 2 g/day in 4 injections
Switch to the oral route as soon as possible to complete 7 days of treatment.

Prevention

– Avoid bathing in endemic areas.
– Rodent control, environmental sanitation (particularly water).
– Vaccination is restricted to personnel exposed in the course of their work.

Relapsing fever (borreliosis)

Relapsing fever (FR) is caused by spirochetes of the genus *Borrelia*, transmitted to humans by arthropod vectors.

Louse-borne relapsing fever (LBRF)

LBRF is caused by *Borrelia recurrentis*. It occurs in epidemic waves when conditions favourable to the transmission of body lice are met: cold climate/season, overcrowding and very poor sanitation (e.g. refugee camps, prisons). Endemic foci of LBRF are mainly the Sudan and the Horn of Africa (especially Ethiopia). LBRF can be associated with louse-borne typhus (see page 185). The mortality rate for untreated LBRF ranges from 15 to 40%.

Clinical features

– Relapsing fever is characterized by febrile episodes separated by afebrile periods of approximately 7 days (4 to 14 days).

– The initial febrile episode lasts up to 6 days:
  • Sudden onset of high fever (> 39°C), severe headache and asthenia, diffuse pain (muscle, joint, back pain), often associated with gastrointestinal disturbances (anorexia, abdominal pain, vomiting, diarrhoea).
  • Splenomegaly is common; bleeding signs (e.g. petechiae, subconjunctival haemorrhage, epistaxis, bleeding gums), jaundice or neurological symptoms may be observed.
  • The febrile episode terminates in a crisis with an elevation in temperature, pulse and blood pressure, followed by a fall in temperature and blood pressure, which may last for several hours.

– Following the initial febrile episode, the cycle usually reccurs; each episode is less severe than the previous one and the patient develops temporary immunity.

– Complications:
  • collapse during defervescence, myocarditis, cerebral haemorrhage;
  • during pregnancy: abortion, preterm delivery, in utero foetal death, neonatal death.

In practice, in an applicable epidemiological setting (see above), a suspect case of LBRF is, according to the WHO, *a patient with high fever and two of the following symptoms: severe joint pain, chills, jaundice or signs of bleeding (nose or other bleeding) or a patient with high fever who is responding poorly to antimalarial drugs*. Clothing should be checked for the presence of body lice and nits.

Laboratory

The diagnosis is confirmed by detection of *Borrelia* in thick or thin blood films (Giemsa stain). Blood samples must be collected during febrile periods. Spirochetes are not found in the peripheral blood during afebrile periods. In addition, the number of circulating spirochetes tends to decrease with each febrile episode.

Treatment

– Antibiotic therapy (suspect or confirmed cases and close contacts):
doxycycline PO[1]
Children: 100 mg as a single dose
Adults: 100 or 200 mg as a single dose
or **erythromycin** PO
Children ≤ 5 years: 250 mg as a single dose
Children > 5 years and adults: 500 mg as a single dose

– Treatment of pain and fever (paracetamol PO) and prevention or treatment of dehydration in the event of associated diarrhoea.

– Elimination of body lice is essential in control of epidemics (see page 101).

Tick-borne relapsing fever (TBRF)

TBRFs are caused by different *Borrelia* species. They are endemic in temperate and warm regions of the word, especially in Africa (Tanzania, DRC, Senegal, Mauritania, Mali, the Horn of Africa) and mainly in rural areas. TBRF is a major cause of morbidity and mortality in children and pregnant women. The mortality rate for untreated TBRF ranges from 2 to 15%.

Clinical features

The clinical manifestations and complications of TBRF are similar to those of LBRF but neurological symptoms (particularly, cranial nerve palsies and lymphocytic meningitis) are more frequent than in LBRF and the number of relapses is higher.

The clinical diagnosis is difficult, especially during the first episode: cases occur sporadically rather than in outbreaks; the tick bite is painless and usually unnoticed by the patient; symptoms are very similar to those of malaria, typhoid fever, leptospirosis, certain arbovirosis (yellow fever, dengue) or rickettsiosis, and meningitis.

[1] Doxycycline is usually contra-indicated in children under 8 years and pregnant women. However, if erythromycin is not available, it may be used for the treatment of LBRF, the administration of a single dose should not cause any adverse effects

Laboratory

– As for LBRF, the diagnosis is confirmed by detection of *Borrelia* in the patient's blood.
– Repeat the examination if the first smear is negative despite strong clinical suspicion.

Treatment

– Antibiotic therapy:
  doxycycline PO
  Children over 8 years: 100 mg/day in 2 divided doses for 5 days
  Adults (except pregnant women): 200 mg/day in 2 divided doses for 5 days
  or **erythromycin** PO
  Children under 8 years: 50 mg/kg/day in 2 divided doses for 5 days
  Pregnant women: 2 g/day in 2 divided doses for 5 days
– Treatment of pain and fever (paracetamol PO) and prevention or treatment of dehydration in the event of associated diarrhoea.

⚠ Antibiotic therapy can trigger a Jarisch-Herxheimer reaction with high fever, chills, fall in blood pressure and sometimes shock. It is recommended to monitor the patient for 2 hours after the first dose of antibiotic, for occurrence and management of severe Jarisch-Herxheimer reaction (symptomatic treatment of shock). Jarisch-Herxheimer reaction appears to occur more frequently in LBRF than in TBRF.

Eruptive rickettsioses

Eruptive fevers caused by bacteria of the genus *Rickettsia* and transmitted to man by an arthropod vector. Three main groups are distinguished: typhus group, spotted fever group and scrub typhus group.

Clinical features: see next page

Laboratory

Detection of specific IgM of each group by indirect immunofluorescence. The diagnosis is confirmed by 2 serological tests at an interval of 10 days. In practice, clinical signs and the epidemiological context are sufficient to suggest the diagnosis and start treatment.

Treatment

– Symptomatic treatment:
  • Hydration (PO or IV if the patient is unable to drink)
  • Fever: **paracetamol** PO (see *Fever*, page 26). Acetylsalicylic acid (aspirin) is contra-indicated due to the risk of haemorrhage.
– Antibiotherapy[1] for 7 days or until 2 days after the fever has disappeared:
  doxycycline PO (except in children under 8 years and pregnant or breast-feeding women):
  Children over 8 years: 100 to 200 mg once daily or in 2 divided doses
  Adults: 200 mg once daily or in 2 divided doses
  or **chloramphenicol** PO (except in pregnant or breast-feeding women)
  Children: 50 to 75 mg/kg/day in 3 divided doses
  Adults: 2 g/day in 3 divided doses
– In pregnant or breast-feeding women:
  josamycin PO[2]: 3 g/day in 3 divided doses for 8 days
– In a context of *epidemic typhus*, **doxycycline** PO 200 mg as a single dose is the choice treatment, but there is a risk of recurrence.
  Note: doxycycline is usually contraindicated in children under 8 years and in pregnant or breast-feeding women. However, the administration of a single dose should not, in theory, provoke adverse effects. Check national recommendations.

Prevention

– Epidemic typhus: control of body lice (page 101).
– Murine typhus: control of fleas and then rats.
– Spotted fevers: avoid tick bites by wearing clothing and using repellents.
– Scrub typhus: use of repellents, chemoprophylaxis with **doxycycline** PO (200 mg once weekly in adults).

---

1 Unlike borrelioses, antibiotic treatment of rickettsioses does not provoke a Jarisch-Herxheimer reaction. However, the geographical distribution of borrelioses and rickettsioses may overlap, and thus a reaction may occur due to a possible co-infection (see *Borrelioses*, page 182).

2 Only some macrolides can be used. Erythromycin is not effective.

Clinical features

– Common to all forms:
- Sudden onset of fever (temperature of over 39°C) with severe headache and myalgias.
- 3 to 5 days later; onset of generalised cutaneous eruption (see below).
- Hypotension; non-dissociated rapid pulse (variable).
- Typhoid state: prostration, omnubilation, confusion and extreme asthenia, particularly marked in typhus forms.
- Inoculation eschar: painless, black crusted lesion surrounded by a erythematous halo at the site of the bite. Always check for this significant sign.
- Non-cutaneous signs vary from one form to another, and are atypical and variable (see below).

Group	**Typhus**		**Spotted fever**			**Scrub typhus**
Form	Epidemic typhus	Murine typhus	Mediterranean spotted fever	Rocky Mountain spotted fever	Other Old-World tick-borne fevers	Scrub typhus
Pathogen	*R. prowasekii*	*R. typhi*	*R. conorii*	*R. rickettsii*	*R. sibirica, R. australis*	*O. tsutsugamushi*
Vector	body lice	rat fleas	ticks	ticks	ticks	mites
Reservoir	**man**	rats	dogs	rodents	rodents, dogs, etc.	rodents
Occurence	**epidemic**	endemic	endemic	endemic	endemic	sporadic
Geographical distribution	worldwide, conflicts; main sites Burundi/Rwanda, Ethiopia	worldwide	around the mediterranean, Sub-Saharan Africa	North America, Central America, Columbia, Brazil	Southern Africa, Australia, Siberia	Far-east, India, South Pacific
Rash	maculopapular	maculopapular	maculopapular	purpural	maculopapular	macular
Eschar	0	0	**black necrotic area**	rare	**black necrotic area**	**black necrotic area**
Typhoid state	+++	+++	+/-	+/-	+ /-	+++
Extra-cutaneous signs	cough, myalgia meningeal signs	gastrointestinal signs	meningeal signs	gastrointestinal and neurological signs, hypotension	variable	meningeal signs
Case fatality (%)	30 (without treatment)	5	2	5	1	0-30

– Complications can be severe, and sometimes fatal: encephalitis, myocarditis, hepatitis, acute renal failure, haemorrhage etc.

CHAPTER 8

Viral diseases

Measles 189

Poliomyelitis 192

Rabies 194

Viral hepatitis 198

Dengue fever 201

Viral haemorrhagic fevers 204

HIV infection and AIDS 207

Measles

Measles is a highly contagious acute viral infection, transmitted by the airborne route (inhalation of respiratory droplets spread by infected individuals). In developing countries, the disease mainly affects children between 1 and 3 years of age. Measles can be prevented by immunization.
For more information, refer to the MSF handbook *Management of a measles epidemic*.

Clinical features

– The incubation period ranges from 10 to 12 days.

– *Prodomal or catarrhal phase* (2 to 4 days)
  • High fever (39-40°C), dry cough, coryza (nasal discharge) and/or conjunctivitis (red and watery eyes)
  • Koplik's spots: small, red, spots with a blue-white centre on the inner surface of the cheeks. This sign is pathognomonic of measles but can be difficult to identify or may be absent at the time of examination.

– *Eruptive phase* (5 to 6 days)
  • On average 3 days after the onset of symptoms, eruption of erythematous, non-pruritic maculopapules, which blanch with pressure. The rash begins on the forehead then spreads downward to the face, neck, trunk (2nd day), abdomen and lower limbs (3rd and 4th day).
  • As the rash progresses, catarrhal symptoms subside. In the absence of complications, the fever disappears once the rash reaches the feet.
  • The rash fades around the 5th day in the same order that it appeared (descending from the head to the feet).

– The eruptive phase is followed by skin desquamation during 1 to 2 weeks, very pronounced on pigmented skin: the skin develops a striped appearance.

In practice, a patient presenting with fever and erythematous maculopapular rash and at least one of the following signs: cough or coryza or conjunctivitis, is a clinical case of measles.

Complications

Complications are common and should be systematically sought:
– Respiratory and ENT: pneumonia, otitis media, laryngotracheobronchitis
– Ophthalmic: purulent conjunctivitis, keratitis, xerophthalmia (risk of blindness)
– Gastrointestinal: diarrhoea, stomatitis
– Acute malnutrition, provoked or aggravated by measles
– Neurological: febrile seizures; rarely: encephalitis (1 case/1000)

Among these complications, pneumonia and dehydration due to diarrhoea are the most common immediate causes of death.

Case management and treatment

– Criteria for hospitalisation:
  • Inability to eat/drink/suck, or vomiting
  • Seizures or altered consciousness
  • Severe acute laryngotracheobronchitis (croup)
  • Severe respiratory infection
  • Diarrhoea with dehydration
  • Acute malnutrition
  • Corneal damage (pain, photophobia, opacity)

  Treatment takes place on an outpatient basis for patients with none of these criteria.

– Isolation

  Patients are contagious from one day before the prodromal period to 4-5 days after the onset of rash:
  • Triage of suspect measles cases in the waiting room
  • Measles cases treated as out-patients should be kept at home during this period
  • Isolation of hospitalised patients

– Treatment
  • Treatment of fever in all cases (paracetamol PO, page XX).
  • Routine prevention of complications or treatment of complications if present:

Complications	Prevention	Treatment
Respiratory and ENT	Nasal irrigation with 0.9% sodium chloride + **amoxicillin** PO: 80 to 100 mg/kg/day in 2 divided doses for 5 days	– Acute pneumonia, page 66 – Acute otitis media, page 57 – Acute laryngitis, page 51
Ophthalmic	Clean the eyes with clean water twice daily + **retinol** (**vitamin A**) PO[1]: Children < 6 months: 50,000 IU once daily on D1 and D2 Children 6 to 12 months: 100,000 IU once daily on D1 and D2 Children > 1 year: 200,000 IU once daily on D1 and D2	– Purulent conjunctivitis or keratitis, page 123 – Xerophthalmia, page 121
Gastrointestinal		– Oral candidiasis, page 92 – Mouth ulcers: apply 0.5% gentian violet. If deep or malodorous ulcers, add: **amoxicillin** PO: 80 to 100 mg/kg/day in 2 doses + **metronidazole** PO: 20 to 30 mg/kg/day in 3 doses for 5 days

1 Retinol reduces the overall risk of severe complications and death.

Complications	Prevention	Treatment
Dehydration	Ensure the child drinks. WHO Plan A in the event of diarrhoea without dehydration (page 306).	WHO Plan B or C depending on the severity of dehydration (pages 308 to 311).
Malnutrition	Increase the quantity or frequency of feedings; small frequent meals (every 2-3 hours); emphasis on highly nutritious foods during illness and convalescence.	– Inability to eat/drink/suck: nasogastric tube for the shortest period possible. – Acute malnutrition: therapeutic management of malnutrition.
Febrile seizures	Treatment of fever (paracetamol); tepid sponging if necessary.	– Seizures, page 23

Prevention

– No chemoprophylaxis for contacts.

– Vaccination:
High vaccine coverage (> 90%) significantly reduces the incidence of measles and the risk of epidemics.
  • Routine vaccination (EPI): one dose of 0.5 ml by deep SC or IM injection at 9 months of age.
  • In situations where there is high risk of infection (overcrowding, epidemics, malnutrition, infants born to a mother with HIV infection, etc.): administer one dose at 6 months of age (between 6 and 8 months) and one dose at 9 months of age (with an interval of at least 4 weeks between injections).

Poliomyelitis

– Poliomyelitis is an acute viral infection due to a poliovirus (serotypes 1, 2 and 3). Human-to-human transmission is direct (faecal-oral) or indirect (ingestion of food and water contaminated by stool). Humans are the only reservoir of the virus. In principle the disease can be eradicated by mass vaccination with oral polio vaccine (OPV).
– In endemic areas, epidemics usually affect children under 5 years of age. In non-endemic areas, where vaccination coverage is low, young adults are most commonly affected.

Clinical features

– In more than 90% of cases, infection is asymptomatic.
– *Non-paralytic form*: a non-specific febrile illness with muscle pain, headache, vomiting, backache; no neurological involvement.
As spontaneous recovery usually occurs within 10 days, diagnosis is rarely made outside epidemic contexts.
– *Paralytic form*: in less than 1% of cases, after the non-specific signs, the patient develops rapid onset (from the morning to the evening) asymmetrical acute flaccid paralysis, predominantly of the lower limbs, with ascending progression. The muscles become soft with diminished reflexes. Sensation is maintained. The disease is life threatening if paralysis involves the respiratory muscles or muscles of swallowing. Initial urinary retention is common. Gastrointestinal disturbances (nausea, vomiting, diarrhoea), muscle pain and meningeal symptoms may also occur.

Laboratory

Look for the polio virus in stool samples. The virus is excreted for one month after infection, but only intermittently; therefore, 2 samples must be collected with an interval of 48 hours.

Treatment

– Hospitalise patients with the paralytic form: rest, prevent bed sores in bedridden patients, give analgesics (do not give IM injections to patients in the febrile phase), ventilate patients with respiratory paralysis.
– Physiotherapy once the lesions are stable to prevent muscle atrophy and contractures.
– Care for sequelae: physiotherapy, surgery and prosthetics.

Patients with acute flaccid paralysis (AFP)

– Consider all patients with AFP as suspected cases of poliomyelitis.

– Confirm the diagnosis by isolating the virus: send the 2 stool samples to a reference laboratory, with a clinical description of the patient. The stool samples must be stored and transported between 0°C and 8°C.

– While waiting for laboratory confirmation, vaccinate all children under 5 years of age living in the area (from the same village or neighbouring villages), irrespective of their vaccination status.

– Once the case is confirmed, organize a mass vaccination campaign: the area and the age group are determined as a function of epidemiological data.

– Surveillance: for each case of AFP there are between 100 and 200 subclinical cases. Therefore, active surveillance to detect new cases is essential for epidemic control.

Prevention

– 2 types of vaccines exist:
  • an injectable inactivated poliovirus vaccine (IPV)
  • a trivalent oral attenuated poliovirus vaccine (OPV)

  In developing countries and during poliomyelitis eradication campaigns, the OPV is recommended for economic reasons, ease of administration and particularly for epidemiological reasons: it induces a rapid intestinal immunity (epidemic) and group protection due to its secondary diffusion into the natural environment

– Vaccination schedule with OPV
  The WHO recommends 4 doses before 1 year of age:

Primary vaccination		Booster doses
Birth	OPV-0*	One year after the last dose and at the age of 6 years
6 weeks	OPV-1	
10 weeks	OPV-2	
14 weeks	OPV-3	

* If the first dose (OPV-0) is not administered at birth, give the 4th dose a minimum of 1 month after the 3rd dose, for example at the same time as measles vaccination.

Rabies

Rabies is a viral infection of wild and domestic mammals, transmitted to humans by the saliva of infected animals through bites, scratches or licks on broken skin or mucous membranes. Any mammal can transmit rabies, but the great majority of human cases are due to dog bites.
Once symptoms develop, rabies presents as a fatal encephalitis. There is no curative treatment; care is palliative.
Before symptomatic disease has developed, rabies can effectively be prevented by post-exposure prophylaxis.

Clinical features

– The incubation period averages 20 to 90 days from exposure (75% of patients), but can be shorter (in severe exposure, i.e. bites to face, head and hands, multiple bites), or longer (20% of patients develop symptoms between 90 days and 1 year, and 5% more than 1 year after exposure).
– Prodromal phase: itching or paraesthesiae around the site of exposure, and non-specific symptoms (malaise, fever, etc.).
– Neurologic phase:
  • Furious form: psychomotor agitation or hydrophobia (throat spasms and panic, triggered by attempting to drink or sight/sound/touch of water) and aerophobia (similar response to a draft of air); sometimes seizures. The patient is calm and lucid between episodes.
  • Paralytic form (less common, 20% of cases): progressive ascending paralysis resembling Guillain-Barré syndrome.

Diagnosis is often difficult: there may be no history of scratch or bite (exposure through licking) or wounds may have healed; a reliable history may be difficult to obtain.

Post-exposure prophylaxis

Risk of rabies virus infection: definition of exposure categories (WHO)

Category I	Contact with animal, or licks on intact skin	**No exposure**
Category II	Nibbles on exposed skin Minor bite(s) or scratch(es) without bleeding	**Minor exposure**
Category III	Transdermal bite(s) or scratch(es) Licks on broken skin Contamination of mucous membranes by animal's saliva (licks) Exposure to bat[1]	**Severe exposure**

Post-exposure prophylaxis is carried out for Category II and III exposures.

1 In the case of direct contact with bats, check national recommendations.

Treatment of the wound

– **In all cases**
Prolonged cleansing of the wound or contact site to eliminate the virus, as soon as possible after exposure, is of critical importance. For skin: use soap, rinse copiously with running water, remove all foreign material; application of **polyvidone iodine** 10% or **ethanol** 70% is an additional precaution which does not take the place of wound washing. For mucous membranes (eye, mouth, etc.): rinse thoroughly with water or 0.9% sodium chloride. Local cleansing is indicated even if the patient presents late.

– **According to condition/type of wound**
In order to avoid inoculating virus deeper into the tissues, wounds are either not sutured at all (e.g. superficial, non-mutilating or puncture wounds), or are left open and re-evaluated in 48-72 hours, with a view to possible closure. Highly contaminated wounds, or wounds that may compromise function, require surgical management (exploration, removal of foreign material, excision of necrotic tissue, copious irrigation with 0.9% sodium chloride or Ringer lactate, with local or general anaesthesia). When suturing is unavoidable, rabies immune globulin should be administered several hours or days before wound closure (see below). Infected wounds are not sutured and reassessed daily.

Passive and active immunisation

Given the variable duration of incubation, administration of vaccine/immune globulin is an urgent priority, even for patients exposed several months previously.

– **Administration of rabies immune globulin**
Rabies immune globulin (RIG) is indicated for Category III exposures[2], and Category II and III exposures in immune-compromised patients.
RIG is intended to neutralize virus in the exposure site. It is given as a single dose on D0, with the first dose of rabies vaccine. Children and adults: **human rabies immune globulin**, 20 IU/kg, or **highly purified equine immune globulin derivative F(ab')2**, 40 IU/kg.
Infiltrate as much of the dose as possible in and around the wounds(s)[3]. Inject any residual product, using the IM route, in a site remote from that used for vaccination. In the event of multiple wounds, dilute the dose 2- to 3-fold with sterile 0.9% sodium chloride to obtain a sufficient quantity to infiltrate all the sites exposed.
If RIG is not available on D0, the first dose of rabies vaccine is administered alone. RIG can still be given as soon as possible within the next few days. However, RIG is no longer recommended when 7 or more days have elapsed since the first dose of vaccine was given, as vaccine-induced immunity will have developed by this time.

2 Unless it can be established that the patient has been correctly vaccinated against rabies before exposure (complete pre-exposure vaccination with 3 doses of a CCV).

3 Infiltrate RIG, even if the wound has healed. For finger wounds, infiltrate very cautiously to avoid causing a compartment syndrome. When it is not possible to infiltrate the wound (mucous membranes), the entire dose is administered IM.

– **Post-exposure rabies vaccination**
A complete rabies vaccination series is indicated for Category II and III exposures. It should be started on D0 and continued to completion if the risk of rabies has not been excluded[4].
Several different types of rabies vaccine are available. Vaccines prepared from cell culture (CCV), e.g. human diploid cells (HDCV), Vero cells (PVRV) or chick embryo cells (PCECV) must replace nerve tissue vaccines (NTV). There are several possible vaccination protocols: check and follow national recommendations. The shortest regimens among those endorsed by the WHO are shown as examples:

Post-exposure vaccination regimens

	No pre-exposure vaccination or **Unknown vaccination status** or **Incomplete pre-exposure vaccination** or **Complete pre-exposure vaccination with a NTV**		**Complete pre-exposure vaccination with a CCV**
	Intramuscular (IM) **2-0-1-1** Administer in the deltoid muscle (anterolateral thigh in children < 2 years), never in the gluteal muscle One IM dose = 0.5 or 1 ml (depending on the manufacturer)	**Intradermal (ID)*** **2-2-2-0-2** Use only PVRV or PCECV vaccine One ID dose = 0.1 ml	**IM** or **ID*** **1-1** One IM dose = 0.5 or 1 ml (depending on the manufacturer) One ID dose = 0.1 ml
D0	2 doses (one dose in each arm or thigh)	2 doses (1 dose in each arm)	1 dose
D3		2 doses (1 dose in each arm)	1 dose
D7	1 dose (in the arm or thigh)	2 doses (1 dose in each arm)	
D21	1 dose (in the arm or thigh)		
D28		2 doses (1 dose in each arm)	
	+ RIG on Day 0, if indicated		*No RIG*

* Incorrect ID technique results in failure of PEP: if correct ID technique cannot be assured, use the IM regimen.

[4] Either through observation of the captured animal (if domestic) or through laboratory diagnosis of the animal (killed). The WHO recommends a 10-day observation period of the animal, if captured. If no signs of rabies develop during the observation period, the risk of rabies is excluded, and rabies vaccination is discontinued. Laboratory diagnosis of the dead animal involves sending the head to a specialised laboratory, which confirms or excludes rabies in the animal. If laboratory diagnosis is negative, risk of rabies is excluded, and rabies vaccination is discontinued.

Other measures

– **Antibiotic therapy or prophylaxis**
  - A 7-day course of antibiotics is indicated for infected wounds (redness, oedema, purulent or serosanguinous drainage, localised cellulitis, lymphangitis, lymphadenopathy, fever). A longer treatment and/or the parenteral route may be indicated in severe infection.
  - Antibiotic prophylaxis (5 to 7 days) is recommended for deep puncture wounds, wounds on the face or hands, wounds involving joints, tendons, ligaments or fractures; very contaminated wounds or those requiring debridement; in immune-compromised patients.
  - Antibiotic prophylaxis is not recommended for superficial wounds or wounds more than 24-48 hours old in patients showing no local or general signs of infection.

  The same dosage is used for both treatment and prophylaxis:
  amoxicillin + clavulanic acid (**co-amoxiclav**) PO[5] (dosage expressed in amoxicillin):
  Children: 50 mg/kg in 3 divided doses; adults: 1.5 g/day in 3 divided doses

– **Tetanus vaccination and immune globulin**
  Verify vaccination status. If unknown or not up-to-date, see page 170.

[5] Co-amoxiclav is the antibiotic of choice. **Doxycycline** (200 mg/day in 2 divided doses) may be used in penicillin-allergic patients, except in pregnant women and children < 8 years.

Viral hepatitis

– Several viral infections of the liver are grouped under the heading of viral hepatitis: hepatitis A, B, C, Δ (delta) and E.
– The different hepatitis viruses are present throughout the world, but their prevalence varies by country. Hepatitis A and B are common in developing countries where nearly the entire population is infected during childhood or adolescence.
– The clinical characteristics of all five diseases are similar enough to make differential diagnosis difficult; however, there are epidemiological, immunological and pathological differences. Patients with hepatitis B, C and Δ may later develop chronic liver disease or even hepatocellular carcinoma.
– The main characteristics of each type of viral hepatitis are summarized in a table on the next page.

Clinical features

– **Asymptomatic forms**
Mild or anicteric forms are the most common, irrespective of the causal virus. The risk of developing later complications from hepatitis B, C and Δ are the same as for symptomatic patients.

– **Classic forms**
Insidious or sudden onset with symptoms of varying intensity: fever, fatigue, nausea, gastrointestinal disturbance, followed by jaundice, dark coloured urine and more or less clay-coloured stool.

– **Fulminant forms**
Hepatocellular failure with severe, often fatal, cytolysis. This form is most frequent in hepatitis B patients with secondary infection with the Δ virus, and in pregnant women infected with hepatitis E during their third trimester (20% mortality).

– **Chronic hepatitis**
Hepatitis B, C and Δ may lead to cirrhosis or hepatoma.

Main profiles observed in different clinical scenarios during HBV infection

Ag HBs	anti-HBs antibodies	anti-HBc antibodies	anti-HBc IgM	Ag HBe	anti-HBe antibodies	HBV DNA	Interpretation
+	(–)	(–)	+	(+)	(–)	(+)	Acute hepatitis
+/–	–	+	–	–	+/–	–	Acute hepatitis, recovery phase
–	+/–	+	–	–	–	–	Post-infectious immunity (cured)
+	–	+	+/–	+	–	+	Chronic hepatitis (wild virus)
–	+	–	–	–	–	–	Post-vaccination immunity

The tests in parentheses are not useful for diagnosis.

	Hepatitis A	Hepatitis B	Hepatitis C	Hepatitis Δ	Hepatitis E
Age group most at risk	Children	Young adults	Young adults	Young adults	Young adults
Transmission	Faecal-oral Contaminated food and water Transfusion (rare)	Blood and blood products Sexual Material contaminated with blood Vertical (mother-to-child)	Blood and blood products Sexual: low Material contaminated with blood (low) Probably vertical	Blood and blood products Sexual Material contaminated with blood Possibly vertical	Faecal-oral Contaminated food and water
Incubation period	2 to 6 weeks	4 to 30 weeks (average 10 weeks)	2 to 25 weeks	Co-infection B/Δ: as for hepatitis B Secondary infection of hepatitis B: approximately 5 weeks	2 to 8 weeks
Period of communicability	Precedes signs. Brief: < 10 days after the appearance of jaundice Most infectious at the end of incubation period.	Precedes signs and lasts entire active period. Can persist in chronic carriers.	Precedes signs. Duration is not well known, probably the same as for hepatitis B. Could persist beyond normalisation of transaminases.	Precedes signs. Duration is not well known, probably the same as for hepatitis B.	Precedes signs. Duration is not well known (10 to 15 days after the appearance of jaundice)
Fulminant forms	0.2 to 0.4%	1 to 3%	More rare than in hepatitis B	Much more common in patients with secondary infection of hepatitis B than in patients with B/Δ co-infection	20% mortality in pregnant women
Prognosis	No chronic forms	Chronicity: 0.2 to 10% of which 5 to 15% progress to cirrhosis. Hepatoma possible	Chronicity: up to 50%, of which 10 to 25% progress to cirrhosis. Hepatoma possible	Chronicity: 2 to 5% for patients with B/Δ co-infection; > 90% if secondary infection of hepatitis B (rapid cirrhosis)	No chronic forms
Individual prevention	Polyvalent immunoglobulin	Specific anti-HBs immunoglobulin Safe sex (condoms)	Specific anti-HBs immunoglobulin may be effective	As for hepatitis B (the Δ virus can only develop with B)	Does not exist
Vaccination	Anti-hepatitis A	Anti-hepatitis B	Does not exist	Anti-hepatitis B	Does not exist
Collective prevention	Hygiene, sanitation	Limit transfusion, screen blood prior to transfusion Single use of disposable material			Hygiene, sanitation

Treatment

– Rest, hydration, no special diet.
– Drug therapy for symptomatic treatment (analgesics, antipyretics, antidiarrhoeals, antiemetics etc.) during the acute phase is contra-indicated as it may aggravate symptoms and the evolution of hepatitis. Corticosteroids are not indicated.

Vaccination

Only against hepatitis A and B. Vaccination against hepatitis B is included in the EPI of some countries.

IM vaccination against hepatitis B:

– *Standard schedule*
  • Newborns, infants
    In countries where perinatal infection is common: one injection after birth, then at 6 and 14 weeks
    Where perinatal infection is less common: one injection at 6, 10 and 14 weeks
  • Children, adolescents, adults
    Schedule 0-1-6: 2 injections 4 weeks apart, then a 3rd injection 5 months after the 2nd injection
– *Accelerated schedule*, when rapid protection is required (imminent departure in highly endemic areas, post-exposure prophylaxis)

  Schedule D0-D7-D21: 3 injections administered during the same month, then a 4th injection one year after the 1st injection

Dengue fever

– Dengue fever is an arthropod-borne viral disease transmitted to man through the bite of the *Aedes* mosquito. It develops sporadically and/or as epidemics (southeast Asia, the Pacific, Africa, the Caribbean and South and Central America). Four different serotypes of dengue virus exist.
– Primary infection with the dengue virus may be asymptomatic or may present as *classical dengue fever*. A second infection with a different serotype may provoke *dengue haemorrhagic fever*, characterised by an increased vascular permeability with loss of plasma from the vascular compartment and haemoconcentration.
– Dengue haemorrhagic fever may progress to *dengue shock syndrome* if, at the end of the febrile period, a significant plasma loss is not well compensated.

Clinical features

– **Dengue fever**
  • fever with headache, retro-orbital pain, muscle and joint pain
  • maculopapular rash on the lower limbs
  • common and benign haemorrhagic signs: skin (petechiae or positive tourniquet test[1]) and more rarely, mucosal (epistaxis, gingival bleeding)
– **Dengue haemorrhagic fever**
  • high fever (39°C-41°C) of sudden onset lasting 2 to 7 days (sometimes with 2 peaks)
  • haemorrhagic signs: skin (petechiae, purpura, ecchymoses, positive tourniquet test[1]); mucous membranes (epistaxis, gingival bleeding); gastrointestinal tract (haematemesis, melaena); bleeding from venepuncture sites
  • hepatomegaly
– **Dengue shock syndrome**
  The critical stage is at the end of the febrile period (from Day 3 to Day 7). The signs preceding shock are: persistent vomiting, intense abdominal pain, agitation or lethargy, sudden hypothermia. Ascites or pleural effusion are possible.
  Signs of shock:
  • rapid and weak, then undetectable pulse
  • cold extremities, profuse sweating
  • narrow pulse pressure, hypotension

Grading severity of dengue haemorrhagic fever (from WHO)

Grade	Clinical features
I	Fever + non-specific general symptoms + haemorrhagic signs (positive tourniquet test[1] and/or easy bruising)
II	Grade I manifestations + spontaneous bleeding (skin or other haemorrhages)
III	Circulatory failure
IV	Profound shock with undetectable pulse and blood pressure

[1] Tourniquet test: inflate a blood pressure cuff on the upper arm to a point midway between the systolic and diastolic pressure for 5 minutes. The test is considered positive when 20 or more petechiae per 2.5 cm square are observed.

Laboratory

– Complete blood count (CBC) and differentials with platelet count: leukopenia and thrombocytopenia are common with ≤ 100 000 platelets/mm^3.

– Haematocrit is the only test that shows haemoconcentration and therefore differentiates dengue fever from dengue haemorrhagic fever (haematocrit elevated 20% above average for the age and sex: e.g. if the average haematocrit for the relevant population is 35%, a haematocrit of 42% corresponds to an increase of 20%).

– Confirmation of the diagnosis:
Confirm the aetiology at the beginning of an epidemic with serology (ELISA or rapid tests): elevated IgG and IgM anti-dengue antibodies confirm a recent infection.
The IgM/IgG ratio differentiates primary infection (high ratio) from a secondary infection (low ratio), and therefore risk of shock.
An increase in antibodies between two samples (from the beginning and end of an episode) confirms an acute infection. The serotype is identified by serology or PCR.

Treatment

– **Dengue fever**
  • Give **paracetamol** PO (see *Fever*, page 26); wrap the patient in a wet cloth. Acetylsalicylic acid (aspirin) is strictly contra-indicated.
  • Prevent or treat moderate dehydration (plenty of fluids, oral rehydration salts, follow *Treatment plans A or B to treat dehydration*, WHO, pages 306 to 310).

– **Dengue haemorrhagic fever** (*Grades I and II*)
  • Hospitalise and observe children under 15 years, patients presenting with significant or repeated haemorrhages, patients with less than 20 000 platelets/mm^3 and all patients having difficulty eating or drinking.
  • Monitor vital signs (pulse, blood pressure, respiratory rate and urine output) every 3 hours and haematocrit every 6 hours. Look for the signs that precede shock.
  • Administer **Ringer Lactate**: 7 ml/kg/hour for 6 hours then adapt according to the clinical evolution and haematocrit.
  If there is an improvement: progressively reduce the rate to 5 ml/kg/hour then 3 ml/kg/hour and stop the infusion after 24 to 48 hours.
  If there is no improvement: increase to 10 ml/kg/hour, then 15 ml/kg/hour.
  Place the patient under a mosquito net.
  IM injections are contra-indicated.

– **Dengue shock syndrome: emergency +++** (*Grades III and IV*)
  • Administer **Ringer Lactate**: 10 to 20 ml/kg in less than 20 minutes, to be repeated if necessary, until a cumulative volume of 30 ml/kg is reached.

  If vital signs and haematocrit improve: change to 10 ml/kg/hour and then adapt accordingly.

  If there are no signs of improvement: administer oxygen and immediately check haematocrit:
  – if the haematocrit is still elevated or has risen: **plasma substitute** 10 to 20 ml/kg infused in less than 10 minutes. Repeat if necessary, until a cumulative volume of 30 ml/kg is reached, then give 10 to 20 ml/kg/hour until improvement in the vital signs is seen.

  - a sudden drop in haematocrit without clinical improvement is a sign of haemorrhage (often gastrointestinal or internal): transfuse fresh blood, 10 to 20 ml/kg (ensure screening for HIV, hepatitis B and C etc.).

- Continue to monitor vital signs every 15 to 30 minutes and check haematocrit every 2 hours for the first 6 hours then every 4 hours. Monitor closely for the following 48 hours as shock may recur.
- Stop the infusions once the vital signs are normal and stable, the patient has regained appetite and the haematocrit is normalised, usually 48 hours after shock.

Warning: monitor for fluid overload. Puffy eyelids are the first sign of fluid overload. Stop the infusion until the puffiness disappears. In the event of pulmonary oedema (laryngeal crackles, dyspnoea, increased respiratory rate, cough with or without frothy expectorant, anxiety, crepitations in both lung fields or tachycardia), give:
furosemide IV, to be repeated after 1 to 2 hours if necessary:
Children: 1 mg/kg/injection
Adults: 40 mg/injection

- In an infant with a febrile seizure: see *Seizures*, page 23.

Prevention

- In endemic areas an epidemic risk exists: report probable or confirmed cases.
- Individual protection: mosquito nets and repellents.
- Vector control is essential, particularly during epidemics: destruction of larval habitats, insecticide spraying.

Viral haemorrhagic fevers

– A dozen diseases with different aetiologies and different modes of transmission are grouped under this name as they present with similar clinical signs.
– Dengue haemorrhagic fever is a viral haemorrhagic fever that is described on page 201.

Clinical features

– Common syndrome (CS):
  • fever higher than 38.5°C
  • short remission on Day 3 or Day 4
  • haemorrhagic symptoms (purpura, epistaxis, haematemesis, melaena etc.)
– The clinical signs are often non-specific, the severity varies depending on the aetiology (see table, page 206).

Laboratory

– Send a sample of whole blood to a reference laboratory (eg. the Pasteur Institute) for serological diagnosis. Attach a clinical description of the patient.
– Wear protective clothing while taking or handling the sample (gloves, protective glasses etc.).
– Use a triple packaging system for shipment. The tube containing the blood specimen is placed in a primary watertight, rigid container enclosing absorbent material between it and the tube containing the blood specimen (1). There must be enough absorbent material to soak up the entire blood sample in the event of a leak. This primary container is then placed in a second rigid container appropriately sealed for transport of infectious materials (2). This second container is placed in a secure carton box that has a visible infectious substance (biohazard) label (3).
– The sample may also be sent on filter paper. It is easier to transport, but the small volume of blood only allows a limited number of aetiologies to be tested.

Management

Suspicion of haemorrhagic fever (isolated case of fever with haemorrhagic symptoms in an endemic area):

– Isolation: isolation ward (or failing that screens/partitions); restrict visitors (provide protective clothing: gowns, gloves, masks).
– Standard precautions:
  The general rules of hygiene must always be respected. The majority of intra-hospital infections have occurred due to a lack of respect for these simple rules.
  • wear gloves for taking samples
  • wear gowns during consultations and care
  • wear thick rubber gloves to handle soiled laundry
  • frequent hand washing
  • respect safe injection practices
– In addition to these non-specific measures wear masks and gloves while examining the patient and protective glasses when there is a risk of splashing.

Confirmed cases of Ebola, Marburg, Lassa, Crimean-Congo haemorrhagic fevers or epidemics of unknown origin:

– More specific measures:
  • strict isolation in a reserved area separate from other patient areas, with a changing room at the entrance/exit
  • disinfection (2% active chlorine), and safe disposal of excreta

  - disinfection of contaminated laundry in chlorine solution (0.1% active chlorine)
  - protective clothing for staff: double gloves, mask, cap, protective glasses, double gown, apron, rubber boots
  - entry/exit: clean laundry for staff at entry; disinfection station at the exit. Gowns, boots and rubber gloves are soaked in a chlorine solution (0.1% active chlorine) for 2 hours before cleaning. Containers for the safe disposal of disposable material. Hand washing with soap.
- The caregiver (maximum one per patient), helped and supervised by the medical staff, follows the same protective measures.
- In the event of a death, do not wash the body. If it is imperative for cultural reasons: wear protective clothing, wash the body with chlorinated water (2% active chlorine), and restrict the number of people involved. Bury the body as quickly as possible, using a body bag when feasible.
- Wear protective clothing when handling contaminated material. No contaminated material should leave the isolation area which includes an incinerator, a sharps pit and a biological waste pit.

Confirmed cases of Yellow fever or Rift Valley fever:
- Standard precautions
- Keep the patient under a mosquito net to prevent transmission

For all patients: report to the Ministry of Health of the country

Treatment

- Aetiological treatment: only for Lassa fever and Crimean-Congo fever (ribavirine).
- Symptomatic treatment:
  - fever: paracetamol (see *Fever*, page 26). Acetylsalicylic acid (aspirin) is contra-indicated.
  - pain: mild (paracetamol), moderate (tramadol), severe (sublingual morphine): see *Pain*, page 29.
  - dehydration: follow *Treatment plans A, B or C to treat dehydration*, WHO, pages 306 to 311.
  - haemorrhagic shock: see page 19
  - seizures: see page 23
  - vomiting: **promethazine** PO
    Children from 2 to 10 years: 10 to 25 mg to be repeated every 6 hours if necessary
    Children over 10 years and adults: 25 mg to be repeated every 6 hours if necessary
- For Ebola and Marburg haemorrhagic fevers: invasive procedures must be strictly limited. Health care staff are at risk of contamination when inserting and maintaining intravenous lines. An intravenous line must be well secured so that the patient, often confused, cannot pull it out.

Prevention

- Vaccination
  - Yellow fever:
    Mass vaccination campaign during an epidemic
    Children from 6 months and adults: a single dose of 0.5 ml IM (preferred) or deep SC, in the deltoid muscle. In pregnant women, only administer during an epidemic.
    Routine vaccination (EPI)
  - Rift Valley fever (only during an epidemic)
- Vector control programmes for known vectors.
- Hospital hygiene measures are essential in all cases.

	Reservoir/ Vector ***Geographical distribution***	**Isolation of patients**	**Clinical feataures** ***(estimated case fatality rate)***
Ebola* **Marburg**	Unknown *Africa*	Strict isolation	CS + sudden onset general malaise, vomiting and diarrhoea *(60-80%)*
Lassa*	Rodents *Central and West Africa*	Strict isolation	CS + facial oedema, purulent pharyngitis, proteinuria on reagent strip *(10-25%)*
Junin and Machupo*	Rodents *South America*	Isolation	CS + vomiting, erythema of the face and, depending on the aetiology: - periorbital oedema, cervical adenopathy, pharyngitis *(15-30%)*
Omsk	Ticks *Europe, Asia*	None	- pharyngitis, reddened conjunctivae *(2-5%)*
Crimean Congo*	Livestock/Ticks *Africa, Asia*	Strict isolation	- oedema of the soft palate, generalised petechial rash *(5-20%)*
FHSR (hantavirus)*	Rodents *Asia and Europe*	None	- proteinuria on reagent strip *(< 1%)*
Kyasanur	Small mammals/Ticks *India*	None	CS + headache, muscle pain, prostration *(2-10%)*
Rift Valley*	Livestock/Mosquitoes *Africa*	None Mosquito nets	Clinical signs: - isolated fever - CS - encephalitis - retinitis and blindness *(30-50%)*
Yellow fever*	Primates/Mosquitoes *Africa, South America*	None Mosquito nets	CS + jaundice, proteinuria on reagent strip, oliguria, headache *(10-30%)*

* VHF with epidemic potential
CS: common syndrome

HIV infection and AIDS

– AIDS (acquired immune deficiency syndrome) is the most severe form of HIV infection (human immunodeficiency virus).
– Two subtypes of HIV have been identified. HIV-1 is more widespread than HIV-2, which is mainly found in West Africa. HIV-2 is less virulent and less transmissible than HIV-1.
– HIV affects the immune system by causing a deficit in CD4 T lymphocytes.

Evolution of the disease

– *Primary infection or acute retroviral syndrome*: 50 to 70% of newly infected individuals develop a viral syndrome (fever, malaise, lymphadenopathy) during seroconversion (from 15 days to 3 months post exposure).
– *Asymptomatic HIV infection* (after seroconversion): a period of clinical latency, but not viral latency. The time period for progression from HIV infection to the development of severe immune deficiency in western countries is 10 years. This period appears to be shorter in developing countries.
– *Symptomatic HIV infection*: with progressive destruction of the immune system, common and more severe diseases occur more frequently, and with higher mortality, in seropositive individuals.
– *AIDS*: this stage corresponds to the development of severe opportunistic infections and neoplasms. From a biological point of view, AIDS is defined as a CD4 count below 200 cells/mm^3. Without treatment the disease progresses rapidly towards death.

WHO clinical staging of HIV/AIDS for adults and adolescents with confirmed HIV infection.

The WHO has proposed a clinical classification of HIV infection with 4 stages of severity:

Clinical stage 1

Asymptomatic
Persistent generalized lymphadenopathy

Clinical stage 2

Unexplained moderate weight loss (< 10% of presumed or measured body weight)
Recurrent respiratory tract infections (sinusitis, tonsillitis, otitis media, pharyngitis)
Herpes zoster
Angular cheilitis
Recurrent oral ulceration
Papular pruritic eruptions
Seborrhoeic dermatitis
Fungal nail infections

Clinical stage 3

Unexplained severe weight loss (> 10% of presumed or measured body weight)
Unexplained chronic diarrhoea for longer than one month
Unexplained persistent fever (> 37.5°C intermittent or constant for > 1 month)
Persistent oral candidiasis
Oral hairy leukoplakia
Pulmonary tuberculosis
Severe bacterial infections (e.g. pneumonia, empyema, pyomyositis, bone or joint infection, meningitis, bacteraemia)
Acute necrotizing ulcerative stomatitis, gingivitis or periodontitis
Unexplained anaemia (< 8 g/dl), neutropenia (< 0.5 x 10^9/L) and/or chronic thrombocytopenia (< 50 x 10^9/L^3)

Clinical stage 4

HIV wasting syndrome
Pneumocystis pneumonia
Recurrent severe bacterial pneumonia
Chronic herpes simplex infection (orolabial, genital or anorectal of more than one month's duration or visceral at any site)
Oesophageal candidiasis (or candidiasis of trachea, bronchi or lungs)
Extrapulmonary tuberculosis
Kaposi's sarcoma
Cytomegalovirus infection (retinitis or infection of other organs)
Central nervous system toxoplasmosis
HIV encephalopathy
Extrapulmonary cryptococcosis including meningitis
Disseminated nontuberculous mycobacteria infection
Progressive multifocal leukoencephalopathy
Chronic cryptosporidiosis
Chronic isosporiasis
Disseminated mycosis (extrapulmonary histoplasmosis, coccidiomycosis)
Recurrent septicaemia (including nontyphoidal *Salmonella*)
Lymphoma (cerebral or B-cell non-Hodgkin)
Invasive cervical carcinoma
Atypical disseminated leishmaniasis
Symptomatic HIV-associated nephropathy or cardiomyopathy

Note: this classification is only for adults and adolescents. Another four-stage clinical staging has been developed for children.

Laboratory

Diagnosis of HIV infection

– The diagnosis of HIV infection is made with serological testing.
– Testing is done *voluntarily* with *informed consent*. Testing is never mandatory. Every individual has the right to know or not to know his HIV status. Test results are *confidential* to avoid discrimination. The individual should have access to *minimum services* offering pre-test and post-test counselling, treatment and support.

– A positive diagnosis is made when at least 2 different tests (2 different brands) are both clearly positive.
– A first negative test should be repeated 3 months later to exclude seroconversion (window period).

CD4 lymphocyte counts

– CD4 cell depletion is a marker of the progression of immune depression. It is a predictor of the development of opportunistic infections or neoplasms and can be used to orient their diagnosis (e.g. cerebral toxoplasmosis or cryptococcal meningitis appear when the CD4 count is below 100 cells/mm^3. If clinical signs indicating these infections are present, but the CD4 count is greater than or equal to 200 cells/mm^3, it is unlikely that these infections are present).
– The CD4 cell count is also used as an indicator for primary prophylaxis (see *primary prophylaxis*, page 211) and initiation of ARV treatment.

Treatment of HIV infection

Antiretroviral treatment (ARV)

A multi-drug (at least 3) antiretroviral regimen (ART) is the reference treatment. It does not eradicate the virus, but slows the progression of the disease and improves the patient's clinical state by reducing viral replication and consequently increasing the CD4 cell count to levels beyond the threshold of opportunistic infections.

Therapeutic classes
Three major classes of ARV exist:
– NRTI (nucleoside/nucleotide reverse transcriptase inhibitors): zidovudine (AZT), lamivudine (3TC), didanosine (ddI), stavudine (d4T), abacavir (ABC), tenofovir (TDF), emtricitabine (FTC).
– NNRTI (non-nucleoside reverse transcriptase inhibitors): efavirenz (EFV), nevirapine (NVP). HIV-2 is naturally resistant to NNRTI.
– PI (protease inhibitors): indinavir (IDV), lopinavir (LPV), ritonavir (RTV), saquinavir (SQV).

Principles of ARV treatment
– Daily triple therapy must be taken for life to prevent the rapid development of resistance. It is important that the patient understands this and that adherence to treatment is optimal.
– The most widely-used and easiest regimens to administer are 2 NRTI + 1 NNRTI: e.g. d4T + 3TC associated with NVP or EFV (EFV is contra-indicated in pregnant women).
– In the event of treatment failure, use as a second-line: 2 other NRTI + 1 PI.

Other possible combinations exist which are less commonly used or more difficult to manage.

Criteria for ARV treatment
As there are large numbers of patients who would benefit from treatment, it seems legitimate to prioritise the treatment of patients already in clinical stage 3 and 4 and patients most at risk of developing severe opportunistic infections (patients with a CD4 count below 200 cells/mm^3).

Monitoring of ARV treatment
CD4 counts are useful in the initiation and follow-up of treatment. CBC, haemoglobin and ALAT are not essential, but can be useful in detecting treatment adverse effects. Viral load (rarely available) is useful for detection of treatment failures.

Treatment of opportunistic and other infections

With progressive immunosuppression, HIV infected patients who are not receiving triple therapy (or patients with poor adherence) become increasingly susceptible to infections. For conditions of clinical stages 2 and 3, standard treatments are usually effective and the diagnosis of HIV infection does not much alter the clinical management. Patients in these stages may benefit from primary prophylaxis (see *primary prophylaxis*, page 211).
Severe opportunistic infections often require sophisticated diagnostic and therapeutic means rarely available. However, with improving health services, most of these diseases can be treated.
For treatment of opportunistic infections, see tables, pages 213 to 219.

Treatment of pain

Treat all patients for associated pain (see *Pain*, page 29).

Prevention of HIV infection

– **Sexual transmission**

The only reliable method of prevention is the use of male or female condoms.
In addition, early diagnosis and treatment of sexually transmitted infections is essential as they increase the transmission of HIV (see Chapter 9).

Post-exposure prophylaxis (PEP): e.g. in the event of rape, ARV treatment begun within 48 hours after possible exposure and given for a duration of 1 month may reduce the risk of infection.

– **Transmission through blood and blood products**

- transfusion: strict respect of indications for transfusion and systematic serological screening of the donor's blood are the two indispensable precautions in the prevention of HIV transmission through transfusions.
- IV drug use: needle and syringe exchange programmes with disposable needles and syringes for users.

– **Occupational transmission** (accidental needle stick injuries or injuries with contaminated objects, contact between a patient's blood and unprotected broken skin or mucous membranes).

Prevention is based on use of universal precautions to avoid contamination with soiled material or potentially infected body fluids.

Post exposure prophylaxis (PEP): e.g. in the event of an accident, ARV treatment begun within 48 hours after the accident and given for a duration of 1 month reduces the risk of infection.

– **Nosocomial transmission**

  Prevention of nosocomial HIV infection is based on the rational use of injections and strict respect for hygiene and sterilisation and disinfection procedures for medical material.

– **Mother-to-child transmission (MTCT)**

  The global rate of vertical transmission varies from 20% to 40%. The risk of transmission through breastfeeding is evaluated at approximately 12% and persists for the duration of breastfeeding.

  In pregnant women: HIV transmission from mother-to-child may be reduced by the administration of ARVs. Many different protocols exist of varying complexity, duration and effectiveness. The most commonly used ARV are AZT, 3TC and NVP. ARV are administered to the mother during pregnancy, labour, post-partum period and to the newborn. Check national recommendations.
  Programmes targeting pregnant women also include other preventive measures: no systematic episiotomy; avoid artificial rupture of the membranes. In certain situations, where the context allows, an elective caesarean section (prior to commencement of labour or rupture of membranes), under antiretroviral cover, may reduce mother-to-child transmission. It is absolutely imperative to consider the risk of a caesarean section against the benefit of this intervention.

  In breastfeeding women: artificial milk if the supply of milk and safe water is guaranteed. If not, exclusive maternal breastfeeding until the age of six months followed by rapid weaning. Mixed feeding (maternal + artificial milk) is contra-indicated.

Prevention of opportunistic infections

In the absence of ARV treatment, all HIV infections become symptomatic and evolve towards AIDS. However, some opportunistic infections can be prevented.

Primary prophylaxis

For HIV infected patients who have not previously contracted an opportunistic infection, in order to prevent the development of some opportunistic infections.

Criteria for primary prophylaxis:
– In the absence of CD4 count: WHO clinical stages 2, 3 and 4.
– If CD4 count is feasible: WHO clinical stages 3 and 4 irrespective of the CD4 count and WHO clinical stages 1 and 2 with CD4 count < 350 cells/mm^3 (or even 500 cells/mm^3, depending on national recommendations).

Infections	Primary prophylaxis
Pneumocystosis Cerebral toxoplasmosis Isosporiasis Various bacterial infections Malaria	**cotrimoxazole** PO: Children: 50 mg SMX + 10 mg TMP/kg once daily Adults: 800 mg SMX + 160 mg TMP once daily

Secondary prophylaxis

For patients who develop a specific opportunistic infection, in order to prevent recurrence once treatment for the infection is completed.

Infections	Secondary prophylaxis	Comments
Pneumocystosis	**cotrimoxazole** PO: Children: 50 mg SMX + 10 mg TMP/kg once daily Adults: 800 mg SMX + 160 mg TMP once daily	Alternative: **dapsone** PO Children: 2 mg/kg once daily without exceeding 100 mg/day Adults: 100 mg once daily
Toxoplasmosis		Alternatives: Adults: **sulfadiazine** PO: 2 g daily + **pyrimethamine** PO: 25 mg daily + **folinic acid** PO: 25 to 30 mg weekly or **dapsone** PO: 200 mg weekly or 50 mg daily + **pyrimethamine** PO: 75 mg weekly + **folinic acid** PO: 25 to 30 mg weekly
Isosporiasis		
Penicilliosis	**itraconazole** PO: Adults: 200 mg once daily	
Histoplasmosis	**itraconazole** PO : Adults: 200 to 400 mg once daily	
Cryptococcal meningitis	**fluconazole** PO: Children: 3 to 4 mg/kg once daily Adults: 200 mg once daily	
Oral or oesophageal candidiasis	**fluconazole** PO: Children: 3 to 6 mg/kg once daily Adults: 100 to 200 mg once daily	Only for frequent and severe recurrences
Herpes simplex	**aciclovir** PO: Children under 2 years: 400 mg/day in 2 divided doses Children over 2 years and adults: 800 mg/day in 2 divided doses	Only for frequent and severe recurrences

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Diarrhoea with or without blood (also see chapter 3)	Diarrhoea is defined as at least 3 liquid stools per day. Aetiologies: **Parasitic infections** • *Isospora belli* • *Cryptosporidium* • *Microsporidium* • *Giardia lamblia* • *Entamoeba histolytica* **Bacterial infections** • *Shigella* • *Salmonella enteritis* • *Campylobacter enteritis* **Mycobacterial infections** • *Mycobacterium tuberculosis* (gastrointestinal TB) • *Mycobacterium avium* complex **Helminthiasis** *Strongyloides stercoralis* **Viral infections** Cytomegalovirus (CMV) **Other causes** • Kaposi's sarcoma • Lymphoma • Idiopathic (HIV infection) • Antiretrovirals (especially lopinavir and ritonavir)	1. History and clinical examination 2. Microscopic examination of stool for ova and parasites (2 to 3 samples) *Note*: *I. belli, Cryptosporidium, Microsporidium*, MAC and CMV are unlikely if CD4 count > 200 cells.	- Persistent (> 2 weeks) or chronic (> 4 weeks) diarrhoea is often associated with weight loss and dehydration. - Prevention or treatment of dehydration is critical (pages 306 to 311). - Depending on the results of the stool examinations: give appropriate treatment. - If there is no laboratory support: ***Acute bloody diarrhoea*** - First-line treatment: Children: **azithromycin** PO: 20 mg/kg once daily for 5 days or **ciprofloxacin** PO: 30 mg/kg/day in 2 divided doses for 7 days Adults: **ciprofloxacin** PO: 1 g/day in 2 divided doses for 7 days - If amoebiasis suspected : **tinidazole** or **metronidazole** PO, see page 88 ***Non-bloody persistent or chronic diarrhea*** Persistent or chronic diarrhoea in HIV-infected patient suggests advanced immunocompromised state. For patients who qualify for ARVs by CD4 count (or unknown CD4 count), ARV initiation is urgent and will usually resolve symptoms in 14 to 28 days. - *Isospora belli*: **cotrimoxazole** PO Children: 80 mg SMX + 16 mg TMP/kg/day in 2 divided doses for 10 days followed by 50 mg SMX + 10 mg TMP/kg/day in 2 divided doses for 3 weeks Adults: 1600 mg SMX + 320 mg TMP/day in 2 divided doses for 7 to 10 days followed by 800 mg SMX + 160 mg TMP/day in 2 divided doses for 3 weeks - *Cryptosporidium*: no specific treatment in HIV-infected patients - *Microsporidium*: **albendazole** PO (limited efficacy) Children: 20 mg/kg/day (max. 800 mg) in 2 divided doses for 7 days Adults: 800 mg/day in 2 divided doses for 2 to 4 weeks - *Helminthiasis*: **albendazole** PO Children > 6 months but ≤ 10 kg: 200 mg once daily for 3 days Children > 6 months and adults: 400 mg once daily for 3 days - *Giardiasis*: **tinidazole** or **metronidazole**, see page 147 - If no improvement (and no contra-indications such as bloody diarrhoea), symptomatic treatment with **loperamide** PO: Children < 2 years: contra-indicated Children 2 to 5 years: 3 mg/day Children 6 to 8 years: 4 mg/day Children > 8 years: 6 to 8 mg/day Adults: initial dose of 4 mg then 2 mg after each liquid stool (max. 16 mg/day)

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Diarrhoea with or without blood (continued)			**Nutrition** ++++ Children: continue to breastfeed; increase daily calorie intake: children 6-11 months: add 150 kcal/d children 12-23 months: add 200 kcal/d children 2-5 years: add 250 kcal/d children 6-9 years: add 350 kcal/d children 10-14 years: add 400 kcal/d Eliminate fresh milk, give porridge prepared with rice water or soup or yoghurts. Give 2.5 ml of oil/meal. Any child 0-5 years should receive zinc sulfate (see page 84). Adults: increase the calorie and protein intake (at least 2 g protein/kg/day). No food is excluded but avoid raw food, fresh milk and foods high in fibre. Encourage small, frequent meals.
Oral and oesophageal lesions	**Fungal infections** • Oral candidiasis: whitish plaques on the oral mucosa, difficult to detatch. If detatched: granulous and bloody base. • Oesophageal candidiasis: pain on swallowing, dysphagia. May result in weight loss. **Viral infections** • Oral hairy leukoplakia (keratosis on the lateral sides of the tongue due to the Epstein-Barr virus) • Oral and oesophageal herpes **Aphthous ulcers**	Clinical examination is usually enough to make a diagnosis. If in doubt: microscopic examination of an oral sample. Consider all severe oral candidiasis (if the pharynx is involved) as oesophageal candidiasis even in the absence of dysphagia.	- Oral candidiasis: **miconazole** gum patch: apply one patch/day to the gums for 7 days or **nystatin** PO (100 000 IU/ml oral susp.): 4 ml 4 times daily for 14 days *Note: oral candidiasis is an indication for PCP prophylaxis* - Oesophageal candidiasis: **fluconazole** PO: Children: 3 to 6 mg/kg once daily for 14 days Adults: 200 mg the first day then 100 mg once daily for 14 days (or if necessary, 200 mg once daily for 14 days according to the clinical response) - Oral hairy leukoplakia: no treatment - Oral herpes: Local treatment and analgesics, see *Stomatitis*, Chapter 3 For recurrent or extensive forms affecting the oesophagus, add: **aciclovir** PO within the 48 hours following the onset of lesions: Children under 2 years: 200 mg 5 times/day for 7 days Children over 2 years and adults: 400 mg 5 times/day for 7 days *Secondary prophylaxis only for patients with frequent recurrences*

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Respiratory problems (also see chapter 2)	Cough and/or thoracic pain and/or dyspnoea in a symptomatic HIV infected patient. Aetiologies: **Bacterial infections** Pyogenic bacteria (*Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus*) **Mycobacterial infections** *M. tuberculosis*, *MAC* **Protozoal infections** *Pneumocystis jiroveci* **Fungal infections** *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Coccidioides immitis*, *Aspergillus spp*, *Penicillium marneffei* **Viral infections** CMV **Neoplasms** • Kaposi's sarcoma • Non-Hodgkin's lymphoma **Others** • Lymphoid interstitial pneumonia • Pleural effusion (often TB) • Pericardial effusion (often TB) • Pneumothorax (may be due to PCP)	1. History and clinical examination: Blood in the sputum? If fever < 7 days, dyspnoea: unlikely TB. If cough > 21 days, weight loss, thoracic pain > 15 days, no dyspnoea: likely TB. Pulmonary auscultation: bilateral lobar pneumonia? 2. If possible: a) Look for AFB in sputum (3 samples) b) Chest x-ray • Pneumocystis: bilateral interstitial infiltrates • Tuberculosis: lobar consolidation, cavitation, pleural effusion, intra-thoracic lymphadenopathy *Warning*: the classic radiological signs of tuberculosis are not always found in HIV + tuberculosis patients. *Notes*: • MAC, pneumocystis, CMV and fungal infections are unlikely in patients with a CD4 count > 200 cells/mm^3 • Staphylococcal pneumonia is often associated with a pyomyositis or an abscess	• For the diagnosis and treatment of upper respiratory tract infections, particularly pneumonia: see Chapter 2 • If the chest x-ray is consistent with staphylococcal pneumonia: Children: see *Staphylococcal pneumonia*, Chapter 2 Adults: **cloxacillin** PO, 2 g/day in 2 divided doses for 10 days • If the sputum examination is AFB+, treat for tuberculosis (no thioacetazone: risk of severe reactions in HIV infected patients) • If the sputum examination is negative and the chest x-ray is consistent with a pyogenic infection in a patient who has not responded to standard treatment: **amoxicillin** + **clavulanic acid** PO (dosages expressed in amoxicillin) Adults: 1.5 g/day in 3 divided doses for 10 to 14 days • Suspect AFB– tuberculosis if the patient does not respond to amoxicillin + clavulanic acid • If the sputum examination is negative and the chest x-ray is consistent with *Pneumocystis jiroveci* pneumonia: **cotrimoxazole** PO for 21 days Children: 100 mg SMX + 20 mg TMP/kg/day in 2 divided doses Adults: 1600 mg SMX + 320 mg TMP, 3 or 4 times daily *Note*: the symptoms may become worse during the first phase of treatment, effectiveness can only be evaluated after one week of treatment. In cotrimoxazole-allergic patients: Adults: **clindamycin** PO or IV: 2.4 g/day in 4 doses or injections + **primaquine** PO: 15 mg once daily for 21 days For either treatment, add **prednisolone** PO for patients with severe pneumocystosis with hypoxia: Children: start with 2 mg/kg/day then decrease the dose following the adult example Adults: 80 mg/day in 2 divided doses for 5 days, then 40 mg/day for 5 days then 20 mg/day for 10 days *Secondary prophylaxis for life is recommended.* • Fungal infections (cryptococcosis, penicilliosis, histoplasmosis): Adults: **amphotericin B** IV: 0.5 to 1 mg/kg/day administered over 4 to 6 hours for 2 weeks (cryptococcosis, penicilliosis) or 3 to 10 days (histoplasmosis), followed by: **fluconazole** PO: 400 mg once daily for 8 weeks for cryptococcosis **itraconazole** PO: 400 mg/day in 2 divided doses for 10 weeks for penicilliosis **itraconazole** PO: 600 mg/day in 2 divided doses for 3 days then 400 mg/day for 12 weeks for histoplasmosis *Secondary prophylaxis for life is recommended.*

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Lymphadenopathy	Enlarged lymph nodes in a symptomatic HIV infected patient Persistent generalised lymphadenopathy (PGL): • 2 or more extra-inguinal sites • lymph nodes > 1.5 cm • enlarged for 3 or more months PGL is usually due to HIV infection. Aetiologies: **HIV infection** **Infections** • Tuberculosis • Syphilis • Histoplasmosis • Toxoplasmosis • CMV **Neoplasms** • Kaposi's sarcoma • Lymphoma	1. Clinical examination: look for a local cause (skin or dental infection etc.); TB or syphilis. 2. Suspected TB: lymph node aspiration, look for AFB, chest x-ray *Note*: in HIV infected patients, tuberculosis is often extra-pulmonary. 3. Suspected syphilis: serology, direct microscopy 4. If all examinations are negative: biopsy is useful to exclude lymphoma, Kaposi's sarcoma and fungal or mycobacterial infections (see notes for patients in Stage 1).	- Treat according to the aetiology or empirical treatment with, for example **cloxacillin** or **doxycycline** PO. - Tuberculosis: treat according to the national protocol. - Early syphilis: **benzathine benzylpenicillin** IM Adults: 2.4 MIU as a single dose (1.2 MIU in each buttock) *Note*: in patients in **Stage 1**, no further investigation (other than 1, 2 and 3 in this table) or treatment are required.

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Headache and neurological disorders in adults	Persistent headache that does not respond to usual analgesics in a symptomatic HIV infected patient. Aetiologies: **Infections** • Tuberculous meningitis • Cryptococcal meningitis • Cerebral toxoplasmosis • Neurosyphilis • CMV encephalitis • HIV encephalopathy • Progressive multifocal leuko-encephalopathy • Cerebral malaria **Neoplasms** Primary CNS lymphoma **Common causes of headache unrelated to HIV infection**: sinusitis, problems with accommodation etc. (sometimes more frequent in HIV infected patients) **Undesirable effects of medication** Some antiretrovirals	History and clinical examination: • Change in mental state • Focal deficits • Seizures • Signs of meningeal irritation • Raised intercranial pressure • Motor problems, ataxia In endemic areas: check for malaria (if febrile): thick and thin films. Lumbar puncture (LP) if not contra-indicated. Elements favouring neurosyphilis: • VDRL positive in blood and/or CSF • cells in the CSF • high protein in the CSF	Positive thick and thin films: see *Malaria*, Chapter 6. For patients with focal signs, treat for toxoplasmosis for 6 weeks: **pyrimethamine** PO: 200 mg in 2 divided doses on the 1st day, then 75 to 100 mg/day + **sulfadiazine** PO: 4 to 6 g/day + **folinic acid** PO: 15 mg/day or, failing that, **cotrimoxazole** PO at high doses: 50 mg SMX + 10 mg TMP/kg/day in 2 divided doses for 4 weeks *A secondary prophylaxis for life is recommended.* Positive lumbar puncture: • Bacterial meningitis: see Chapter 7 • Tuberculous meningitis: treat according to the national protocol • Cryptococcal meningitis: **amphotericin B** IV 0.5 to 1 mg/kg/day for 2 weeks followed by **fluconazole** PO 400 mg once daily for 8 weeks *A secondary prophylaxis for life is recommended.* *Note*: intracranial pressure (ICP) is often raised in cryptococcal meningitis. To lower ICP, repeated punctures to drain CSF may be necessary at the beginning of treatment. Neurosyphilis: **benzylpenicilin** IV: 12 to 24 MIU/day in 6 injections at 4 hour intervals for 14 days or **benzylpenicillin procaine** IM: 1.2 g once daily + **probenecid** PO: 2 g/day in 4 divided doses for 10 to 14 days Headache of no known origin: symptomatic treatment starting with a step 1 analgesic (see *Pain*, chapter 1).

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Neurological disorders in children	Aetiologies: • Bacterial meningitis • Tuberculous meningitis • Cryptococcal meningitis • Cerebral toxoplasmosis • CMV meningo-encephalitis • Cerebral malaria	Good history taking as only patients with acute episodes benefit from specific aetiological treatment (seizures, meningeal syndrome, focal signs). In endemic areas, check for malaria (if febrile): thick and thin films. Lumbar puncture (LP) if not contra-indicated.	Positive thick and thin films: see *Malaria*, Chapter 6. If LP is not possible: • Treat for bacterial meningitis if patient febrile and/or meningeal syndrome (see Chapter 7). • Treat for toxoplasmosis if focal signs present: **pyrimethamine** PO: 2 mg/kg/day in 2 divided doses for 2 days then 1 mg/kg/day + **sulfadiazine** PO: 80 mg/kg/d in 2 divided doses + **folinic acid** PO: 10 mg once daily for 8 weeks or, failing that, **cotrimoxazole** PO at high doses: 100 mg SMX + 20 mg TMP/kg/day in 2 divided doses for 4 weeks *A secondary prophylaxis for life is recommended.* If the LP is positive: • Bacterial meningitis: see Chapter 7 • Tuberculous meningitis: treat according to the national protocol • Cryptococcal meningitis: **amphotericin B** by very slow IV infusion over 6 hours: 0.7 mg/kg/day for 2 weeks followed by **fluconazole** PO: 6 to 8 mg/kg once daily for 8 weeks *A secondary prophylaxis for life is recommended.*
Persistent or recurrent fever	Temperature higher than 38°C, chronic (lasting more than 5 days) or recurrent (multiple episodes in a period of more than 5 days) Aetiologies : **Infections** • Common childhood diseases • Severe bacterial infections (TB, pneumonia, typhoid fever, septicaemia, meningitis, endocarditis etc.) • Occult bacterial infections (sinusitis, otitis, urinary tract infections) • Opportunistic infections (TB, mycosis, toxoplasmosis) • Malaria **Neoplasms** Non-Hodgkin's lymphoma **HIV infection** **Fever caused by medication**	1. History and clinical examination: look for a ENT or urinary infection, TB, skin infection, enlarged lymph nodes etc. 2. In endemic areas, check for malaria: thick and thin films. 3. Suspected TB: look for AFB. 4. Chest x-ray, CBC, blood cultures, urinalysis, stool culture, serology, lumbar puncture (LP). If the patient is under treatment, think of a fever caused by secondary effects of medication.	Positive thick and thin films: see *Malaria*, Chapter 6. If testing is not available: in endemic zones, give systematic malaria treatment. Suspected meningitis: treat according to the results of the LP. If LP is not available, treat for bacterial meningitis, see Chapter 7. Identified or suspected focus of infection: ENT: see Chapter 2; urinary: see Chapter 9 etc. Tuberculosis: treat according to the national protocol.

Symptoms	Definitions and aetiologies	Treatment
Skin lesions (see also Chapter 4)	**Bacterial infections** • Furunculosis • Impetigo and pyoderma • Axillary hidradenitis • Pyomyositis • Bacillary angiomatosis • Syphilis	**Bacterial infections**: • Furunculosis, impetigo, chronic folliculitis: local treatment, +/- **cloxacillin** PO: see *Bacterial skin infections*, Chapter 4. • Suppurative axillary hidradenitis: local treatment + **doxycycline** PO: 200 mg/day in 1 or 2 divided doses for 6 weeks (in adults) • Pyomyositis: antibiotics/surgical drainage, see *Pyomyositis*, Chapter 10. • Bacillary angiomatosis: Adults: **erythromycin** PO 2 g/day in 2 or 3 divided doses for 2 months or **doxycycline** PO 200 mg/day in 2 divided doses for 2 months • Primary and secondary syphilis: see Chapter 9.
	Viral infections • Herpes zoster • Herpes simplex • Genital warts • *Molluscum contagiosum*	**Viral infections**: • Herpes zoster: local treatment and analgesics, see *Herpes simplex and herpes zoster*, Chapter 4 For necrotic, extensive forms, eruption on the face, ophthalmic zoster, add **aciclovir** within 48 hours of the onset of lesions: Children (IV route): 15 to 30 mg/kg/day in 3 infusions (every 8 hours) for 7 days Adults (oral route): 800 mg 5 times daily for 7 days • Herpes simplex: local treatment, see *Herpes simplex and herpes zoster*, Chapter 4. • Genital warts: see Chapter 9.
	Fungal infections Candidiasis, dermatophytoses and deep mycoses (penicilliosis, cryptococcosis, histoplasmosis etc.)	**Fungal infections**: • Candidiasis: **gentian violet** or **nystatin** ointment, twice daily • Dermatophytoses: see *Superficial fungal infections*, Chapter 4.
	Neoplasms Kaposi's sarcoma	
	Other skin infections • Chronic prurigo or urticaria • Severe seborrhoeic dermatitis • Psoriasis • Scabies • Diffuse cutaneous xerosis	**Other skin infections**: • Prurigo, urticaria: see *Other skin disorders*, Chapter 4. • Seborrhoeic dermatitis: **gentian violet** or **Whitfield's ointment** or **ketoconazole** or 2% **miconazole** applied twice daily. For severe inflammation, use a topical corticosteroid in combination with either miconazole or ketoconazole. • Xerosis: **zinc oxide** ointment or **calamine** lotion • Psoriasis: **corticosteroides** and **zinc oxide** ointment • Scabies: local treatment. For crusted or profuse scabies, add **ivermectin** PO (see *Scabies*, Chapter 4).
	Rash caused by medication	
	Bed sores	

CHAPTER 9

Genito-urinary diseases

Uro-nephrologic diseases

- Urolithiasis 223
- Acute cystitis 224
- Acute pyelonephritis 226
- Acute prostatitis 228

Genital infections (GI) 229

- Urethral discharge 231
- Abnormal vaginal discharge 233
- Genital ulcers 236
- Lower abdominal pain in women 239
- Upper genital tract infections (UGTI) 240
- Veneral warts 243
- Major genital infections (summary) 244

Metrorrhagia 246

Urolithiasis

Partial or complete obstruction of the urinary tract by one or more calculi.

Clinical features

– Acute, sometimes intense, flank or pelvic pain (renal colic).
– Haematuria, may be accompanied by the passage of a calculus.
– Urinalysis: haematuria, leucocyturia may be present.
– Secondary infections may develop: cystitis (see page 224) or pyelonephritis (see page 226).

Treatment

– Increase fluid intake: 3 to 4 litres/day
– Analgesics:
  • For moderate pain:
    diclofenac PO: 150 mg/day in 3 divided doses for 3 days
    + **hyoscine butylbromide** PO: 30 to 60 mg/day in 3 divided doses for 3 days
  • For renal colic:
    diclofenac IM: 75 mg/injection, 1 or 2 times/day for a maximum of 2 days then change to oral treatment
    + **hyoscine butylbromide** IM: 10 to 20 mg/injection to be repeated every 8 hours according to the clinical evolution
– In patients with infection: antibiotic treatment as for pyelonephritis (see page 226). The effectiveness will depend on the passage of the calculus.

Acute cystitis

Cystitis is an infection of the bladder and urethra that affects mainly women and girls from 2 years of age. *Escherichia coli* is the causative pathogen in 70 to 95% of cases. Other pathogens include *Proteus mirabilis*, enterococcus, *Klebsiella* spp and in young women, *S. saprophyticus*.

Clinical features

– Burning pain on urination and pollakiuria (passing of small quantities of urine more frequently than normal); in children: crying when passing urine; involuntary loss of urine.

AND

– No fever (or mild fever), no flank pain; no systemic signs and symptoms in children

It is essential to rule out pyelonephritis (see page 226).
The symptom 'burning pain on urination' alone is insufficient to make the diagnosis. In the event of abnormal vaginal discharge, see page 233.

Laboratory

– Urine dipstick test:
  Perform dipstick analysis for nitrites (which indicate the presence of enterobacteria) and leukocytes (which indicate an inflammation) in the urine.
  • If dipstick analysis is negative for both nitrites and leukocytes, a urinary infection is excluded.
  • If dipstick analysis is positive for nitrites and/or leukocytes, a urinary infection is likely.
– Microscopy/culture: when a dipstick analysis is positive, it is recommended to carry out urine microscopy/culture in order to confirm the infection and identify the causative pathogen, particularly in children and pregnant women.

When urine microscopy is not feasible, an empirical antibiotic treatment should be administered to patients with typical signs of cystitis and positive dipstick urinalysis (leucocytes and/or nitrites).

Note: aside of these results, in areas where urinary schistosomiasis is endemic, consider schistosomiasis in patients with macroscopic haematuria or microscopic haematuria detected by dipstick test, especially in children from 5 to 15 years, even if the patient may suffer from concomitant bacterial cystitis.

Treatment

Cystitis in girls ≥ 2 years

cefixime PO : 8 mg/kg once daily for 3 days
or **amoxicillin/clavulanic acid** PO: 45 to 50 mg/kg/day in 2 divided doses for 3 days

Cystitis in non pregnant women

– If dipstick analysis is positive for both nitrites and leukocytes:
fosfomycin-trometamine PO: 3 g as a single dose
or **ciprofloxacin** PO: 500 mg/day in 2 divided doses for 3 days
or **nitrofurantoin** PO (except in patients with G6PD deficiency): 300 mg/day in 3 divided doses for 5 days
– If dipstick analysis is negative for nitrites but positive for leukocytes, the infection may be due to *S. saprophyticus*. Fosfomycin is not active against this pathogen. Use ciprofloxacin or nitrofurantoin, as above.
– Whatever the antibiotic used, symptoms may persist for 2 to 3 days despite adequate treatment.
– In the event of treatment failure (or recurrent cystitis i.e. > 3-4 episodes/year), **ciprofloxacin** PO: 1 g/day in 2 divided doses for 5 days
– For patients with recurrent cystitis, consider bladder stones, urinary schistosomiasis, urinary tuberculosis or gonorrhoea (examine the partner).

Cystitis in pregnant or lactating women

fosfomycine-tromethamine PO as above
or **cefixime** PO: 400 mg/day in 2 divided doses for 5 days
or **nitrofurantoin** PO (except in the last month of pregnancy, the first month of breast-feeding and in patients with G6PD deficiency): 300 mg/day in 3 divided doses for 5 to 7 days

Acute pyelonephritis

Pyelonephritis is an acute infection of the renal parenchyma, potentially severe, especially in pregnant women, neonates and infants. The pathogens causing pyelonephritis are the same as those causing cystitis (see page 224).

Clinical features

Neonates and infants

– Symptoms are not specific: fever, irritability, vomiting, poor oral intake. Palpation of the lower abdomen may show abdominal tenderness. The absence of fever does not rule out the diagnosis. On the other hand, fever –with no obvious cause– may be the only manifestation.
– Neonates may present with fever or hypothermia, altered general condition, altered conscious state, pale/grey colour, shock.

In practice, a urinary tract infection should be suspected in children with unexplained fever or septic syndrome with no obvious focus of infection.

Older children and adults

– Signs of cystitis (burning on urination and pollakiuria, etc.)
AND
– Fever > 38.5°C and flank pain (often unilateral) or abdominal tenderness

Laboratory

See *Cystitis* page 224

Treatment

– Antibiotic therapy in children

- *Children under one month*
  cefotaxime IV: 150 mg/kg/day in 3 injections for 10 days
  or **ampicillin** IV: 200 mg/kg/day in 3 injections for 10 days + **gentamicin** IM or IV: 5 mg/kg once daily for 5 days
- *Children over one month*
  ceftriaxone IM or IV: 50 mg/kg once daily until the child's condition improves (at least 3 days), then change to oral treatment with **amoxicillin/clavulanic acid** PO: 45 to 50 mg/kg/day in 2 divided doses or **cefixime** PO: 8 mg/kg once daily (for children over 3 months) to complete 10 days of treatment

– Antibiotic therapy in adults

  • *Pyelonephritis with no signs of serious illness*
  ciprofloxacin PO: 1 to 1.5 g/day in 2 or 3 divided doses for 7 days
  or **cefixime** PO: 400 mg/day in 2 divided doses for 10 days

  • *Presence of signs of serious illness* (vomiting, patient seen late in disease, sepsis) or *patient is in poor general condition* (e.g. malnutrition, presence of other diseases)
  ceftriaxone IM: 1 g/once daily for at least 3 days, then change to oral treatment with **cefixime** PO: 400 mg/day in 2 divided doses to complete 10 to 14 days of treatment (up to 21 days depending on clinical response)
  + **gentamicin** IM: 3 to 6 mg/kg once daily for 3 days (if sepsis)
  or, if not available:
  ampicillin IV: 8 g/day in 3 injections for at least 3 days + **gentamicin** IM: 3 to 6 mg/kg once daily for 3 days, then change to oral treatment with **amoxicillin** PO: 4 g/day in 2 divided doses to complete 10 to 14 days of treatment

– Treatment of fever and pain (use paracetamol rather than NSAID, see page 26).

– Maintain proper hydration (1.5 litre/day in adults), especially in children (risk of dehydration); treat dehydration if present (see page 305 to 311).

– Management of septic shock if needed.

Acute prostatitis

Acute infection of the prostate, most commonly due to Gram negative bacteria.

Clinical features

– Signs of cystitis (burning on urination and urinary frequency) with fever in men, perineal pain is common.
– Very painful rectal examination.
– Urinalysis: leucocyturia and pyuria; haematuria may be present.

Treatment

Difficult, the infection may become chronic.

– Increase fluid intake: 3 to 4 litres/day
– Fever (see page 26) and pain (see page 29)
– Prolonged antibiotic treatment:
  ciprofloxacin PO: 1 g/day in 2 divided doses for 28 days

Genital infections (GI)

The diagnosis and treatment of genital infections present several difficulties: clinical features are not specific; many infections are asymptomatic; laboratory tests available in the field are not always reliable; mixed infections are common; partners need to be treated simultaneously in case of sexually transmitted infections[1] and the risk of recurrence or treatment failure is increased in HIV-infected patients.

Thus, the WHO has introduced the syndromic management of GI and developed standardised case management flowcharts: based on the identification of consistent groups of signs and symptoms (syndromes), patients are treated for the pathogens/infections[2] that may cause each syndrome.

Look for a genital infection if a patient complains of:	See
Urethral discharge Painful or difficult urination (dysuria)	Urethral discharge, page 231
Abnormal vaginal discharge Vulvar itching/burning Pain with intercourse (dyspareunia) Painful or difficult urination (dysuria)	Abnormal vaginal discharge, page 233
Genital blisters or sores Burning sensation in the vulva or perineum	Genital ulcers, page 236
Skin growths in the genital (or anal) area	Venereal warts, page 243
Lower abdominal pain (in women)	Lower abdominal pain, page 239 Upper genital tract infections, page 240

Basic principles of GI management:

– The patient can be effectively treated without laboratory testing. Some tests may help in diagnosing vaginal and urethral discharge, but they should never delay treatment (results should be available within one hour).

– The patient should be treated at his/her first encounter with the health care provider (no patient should be sent home without treatment, e.g. while waiting for laboratory results).

– Single dose regimens are preferred when indicated.

– In the case of urethral discharge, abnormal vaginal discharge (except candidiasis), genital ulcers (except herpes) and sexually transmitted upper genital tract infection, the sexual partner should receive a treatment. In the case of candidiasis, genital herpes and venereal warts, the partner is treated only if symptomatic.

– Patients with sexually transmitted infections should receive information on their disease(s) and treatment and be counselled on risk reduction and HIV testing. Condoms should be provided for the duration of treatment.

[1] Genital infections may be sexually transmitted (e.g. gonorrhoea, chlamydia) or not (e.g. most cases of candidiasis).

[2] Keep in mind that in *Schistosoma haematobium* endemic areas, genital symptoms may also be due to, or associated with, genitourinary schistosomiasis (see page 151).

Special situation: sexual violence

Taking into consideration the physical, psychological, legal and social consequences of sexual violence, *medical care* is not limited to the diagnosis and treatment of genital lesions or infections.

Care includes listening to the victim's story, a complete physical examination, laboratory tests if available, and completion of a medical certificate (see *Practical advice for writing medical certificates in the event of sexual violence*, page 312).

During the consultation, prophylactic or curative treatments must be proposed to the patient.

– Prophylactic treatment:
  • priority is given to the risk of HIV transmission (earliest possible antiviral therapy for patients seen within 48-72 hours after exposure, see *HIV infection and AIDS*, page 207) and to the risk of pregnancy resulting from rape (administer emergency contraception as soon as possible, ideally within 72 hours of exposure: **levonorgestrel** PO: one 1500 µg tablet or two 750 µg tablets as a single dose)[3];
  • prevention of sexually transmitted infections includes a single dose treatment with azithromycin 1 g + cefixime 400 mg. If necessary, treatment of trichomoniasis may follow;
  • tetanus prophylaxis and/or vaccination (see *Tetanus*, page 170) if there are any wounds;
  • vaccination against hepatitis B (see *Viral hepatitis, accelerated vaccination schedule*, page 200).
– Curative treatment:
  • of wounds,
  • of any related pathologies/infections if the assault is not recent.

Mental health care is necessary irrespective of any delay between the event and the patient arriving for a consultation. Care is based on immediate attention (one-on-one reception and listening) and if necessary, follow-up care with a view to detecting and treating any psychological and/or psychiatric sequelae (anxiety, depression, post-traumatic stress disorder, etc.).

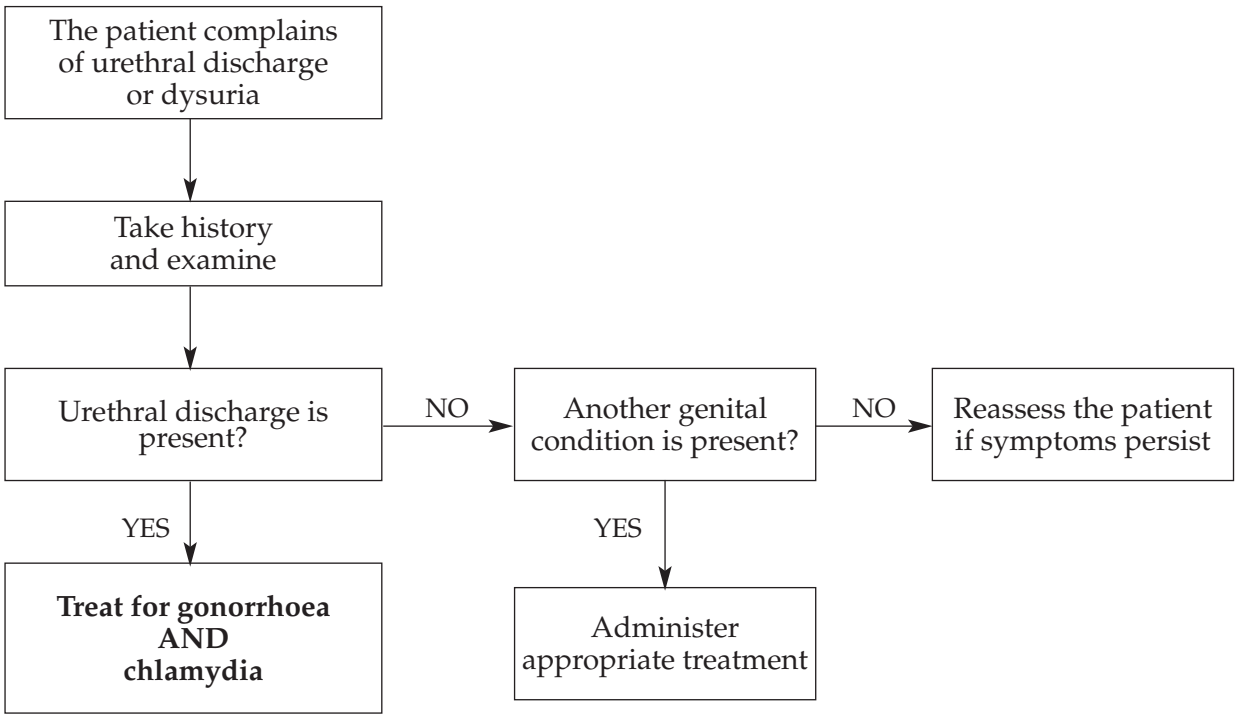
[3] Genital infections may be sexually transmitted (e.g. gonorrhoea, chlamydia) or not (e.g. most cases of candidiasis).

Urethral discharge

Urethral discharge is seen almost exclusively in men. The principal causative organisms are *Neisseria gonorrhoeae* (gonorrhoea) and *Chlamydia trachomatis* (chlamydia).

The presence of abnormal discharge should be confirmed by performing a clinical examination[1]. In males, the urethra should be milked gently if no discharge is visible. Furthermore, specifically check for urethral discharge in patients complaining of painful or difficult urination (dysuria).

Case management



Laboratory

- *C. trachomatis* cannot easily be identified in a field laboratory. In the absence of validated rapid diagnostic tests, the treatment is empiric.
- In men, a methylene blue or Gram stained smear from a urethral swab may be used to detect gonococci (Gram negative intracellular diplococci).

[1] In areas where lymphatic filariasis is endemic, be careful not to confuse purulent urethral discharge with milky or rice-water urine (chyluria) suggestive of lymphatic filariasis.

Treatment of the patient

– In men:
  • If microscopy of a urethral smear has been performed: in the absence of gonococci, treat for chlamydia alone; in the presence of gonococci, treat for chlamydia AND gonorrhoea.
  • When no laboratory is available, treat for chlamydia AND gonorrhoea.
– In women:
  Treat for chlamydia AND gonorrhoea.

Men and non-pregnant women		
Treatment for chlamydia		**Treatment for gonorrhoea**
azithromycin PO: 1 g as a single dose or **doxycycline** PO: 200 mg/day in 2 divided doses for 7 days	**PLUS**	**cefixime** PO: 400 mg as a single dose or **ceftriaxone** IM: 250 mg as a single dose or **spectinomycin** IM: 2 g as a single dose
Pregnant women		
azithromycin PO: 1 g as a single dose or **erythromycin** PO: 2 g/day in 2 or 4 divided doses for 7 days	**PLUS**	**cefixime** PO: 400 mg as a single dose or **ceftriaxone** IM: 250 mg as a single dose

If urethral discharge persists or reappears after 7 days:
– Verify that the patient has received an effective treatment (i.e. one of the combinations above).
– Gonococcal resistance is a possibility if another treatment (e.g. cotrimoxazole or kanamycin) has been administered: re-treat for gonorrhoea as above (chlamydia is rarely resistant).
– If an effective antibiotic therapy has been given, consider trichomoniasis (**tinidazole** or **metronidazole** PO, 2 g as a single dose); also consider re-infection.

Treatment of the partner

The sexual partner receives the same treatment as the patient, whether or not symptoms are present.

Abnormal vaginal discharge

Abnormal vaginal discharge is defined as discharge that differs from usual with respect to colour/odour/consistency (e.g. discoloured or purulent or malodorous).

Abnormal discharge is often associated with vulvar pruritus or pain with intercourse (dyspareunia), or painful or difficult urination (dysuria) or lower abdominal pain. Routinely check for abnormal vaginal discharge in women presenting with these symptoms.

Abnormal vaginal discharge may be a sign of infection of the vagina (vaginitis) and/or the cervix (cervicitis) or upper genital tract infection.
The presence of abnormal discharge must be confirmed by performing a clinical examination: inspection of the vulva, speculum exam (checking for cervical/vaginal inflammation or discharge).
Abdominal and bimanual pelvic examinations should be performed routinely in all women presenting with vaginal discharge to rule out upper genital tract infection (lower abdominal pain and cervical motion tenderness).

The principal causative organisms are:
- In vaginitis: *Gardnerella vaginalis* and other bacteria (bacterial vaginosis), *Trichomonas vaginalis* (trichomoniasis) and *Candida albicans* (candidiasis).
- In cervicitis: *Neisseria gonorrhoeae* (gonorrhoea) and *Chlamydia trachomatis* (chlamydia).
- In upper genital tract infections: see page 240.

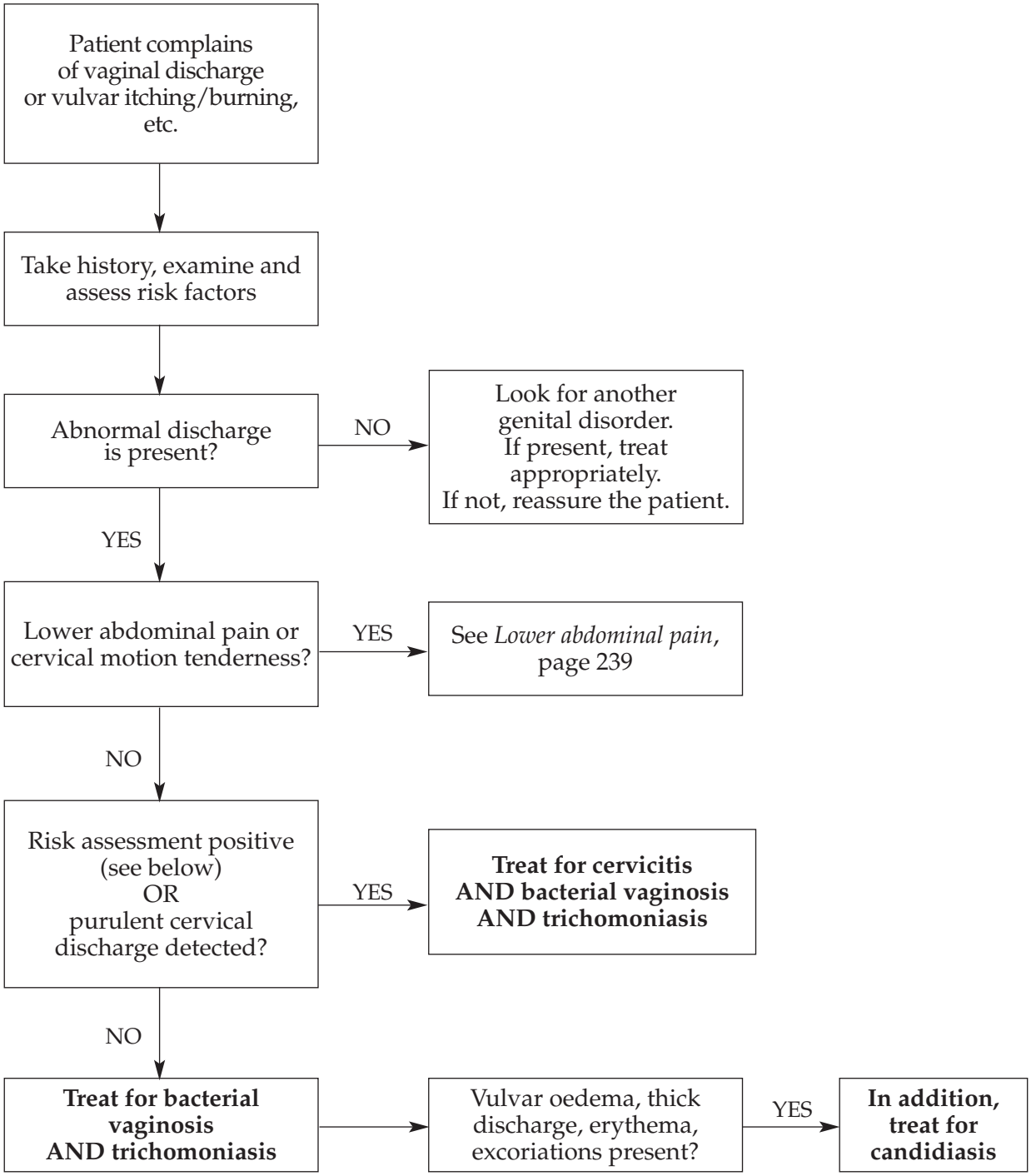
Case management

See algorithm, following page.

Laboratory

- Tests usually available in the field can only identify causes of vaginitis, and thus are of limited usefulness.
  Microscopic examination of a fresh wet smear may show mobile *T. vaginalis*, yeast cells and hyphae in candidiasis, and "clue cells" in bacterial vaginosis.
- Identification of *N. gonorrhoeae* by Gram stained smear is not sensitive in women and is not recommended.

Case management


Patient complains of vaginal discharge or vulvar itching/burning, etc.
Take history, examine and assess risk factors
Abnormal discharge is present?
NO
Look for another genital disorder. If present, treat appropriately. If not, reassure the patient.
YES
Lower abdominal pain or cervical motion tenderness?
YES
See *Lower abdominal pain*, page 239
NO
Risk assessment positive (see below) OR purulent cervical discharge detected?
YES
Treat for cervicitis AND bacterial vaginosis AND trichomoniasis
NO
Treat for bacterial vaginosis AND trichomoniasis
Vulvar oedema, thick discharge, erythema, excoriations present?
YES
In addition, treat for candidiasis

Cervicitis may be difficult to diagnose. When in doubt, administer treatment for cervicitis to women with abnormal vaginal discharge and any of the following risk factors:

– Urethral discharge in the partner
– Context of sexual violence or prostitution
– New partner or more than one partner in the preceding 3 months

Treatment of the patient

– **Cervicitis**

Treat for both chlamydia AND gonorrhoea.

Non-pregnant women		
Treatment for chlamydia		**Treatment for gonorrhoea**
azithromycin PO: 1 g as a single dose or **doxycycline** PO: 200 mg/day in 2 divided doses for 7 days	**PLUS**	**cefixime** PO: 400 mg as a single dose or **ceftriaxone** IM: 250 mg as a single dose or **spectinomycin** IM: 2 g as a single dose
Pregnant women		
azithromycin PO: 1 g as a single dose or **erythromycin** PO: 2 g/day in 2 or 4 divided doses for 7 days	**PLUS**	**cefixime** PO: 400 mg as a single dose or **ceftriaxone** IM: 250 mg as a single dose

– **Bacterial vaginosis** and **trichomoniasis**

tinidazole PO: 2 g as a single dose
or **metronidazole** PO: 2 g as a single dose

In the case of treatment failure:
tinidazole PO: 1 g/day in 2 divided doses for 5 days
or **metronidazole** PO: 800 to 1000 mg/day in 2 divided doses for 7 days

– **Vulvovaginal candidiasis**

clotrimazole (500 mg vaginal tablet): 1 tablet as a single dose, inserted deep into the vagina at bedtime

or, if not available,
clotrimazole (100 mg vaginal tablet): one tablet inserted deep into the vagina at bedtime for 6 days
or **nystatin** (100,000 IU vaginal tablet): one tablet inserted deep into the vagina at bedtime for 14 days

If the patient has extensive vulvar involvement, **miconazole 2%** cream (2 applications to the vulva daily for 7 days) may be used in combination with the intravaginal treatment above. Miconazole cream may complement, but does not replace, treatment with clotrimazole.

Treatment of the partner

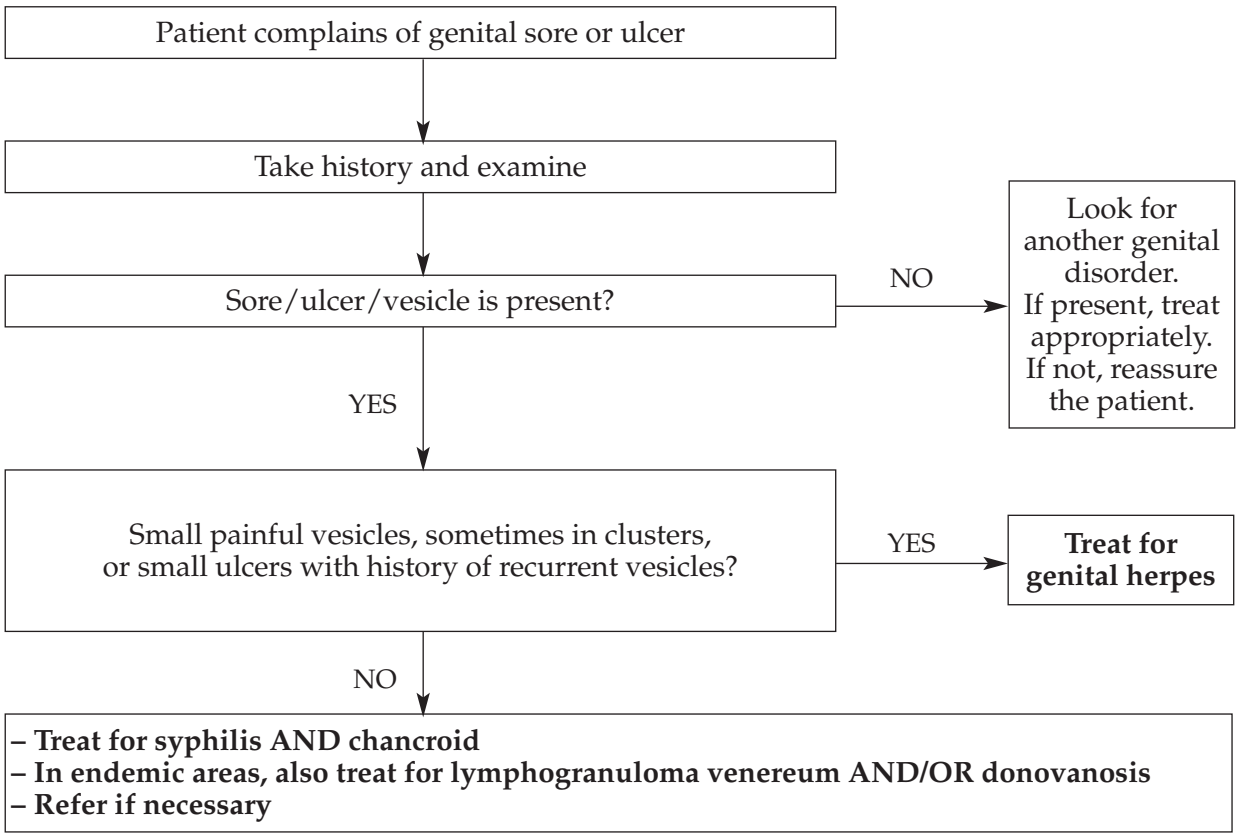
When the patient is treated for vaginitis or cervicitis, the sexual partner receives the same treatment as the patient, whether or not symptoms are present.

In the case of vulvovaginal candidiasis, the partner is treated only if symptomatic (itching and redness of the glans/prepuce): **miconazole 2%**, 2 applications daily for 7 days.

Genital ulcers

Genital ulcers, defined as single or multiple vesicular, ulcerative or erosive lesions of the genital tract, with or without inguinal lymphadenopathy, should lead to consideration of sexually transmitted infection.
The principal causative organisms are *Treponema pallidum* (syphilis), *Haemophilus ducreyi* (chancroid) and *Herpes simplex* (genital herpes). *Chlamydia trachomatis* (lymphogranuloma venereum) and *Calymmatobacterium granulomatis* (donovanosis)[1] are less frequent.

Case management


Patient complains of genital sore or ulcer
Take history and examine
Sore/ulcer/vesicle is present?
NO
Look for another genital disorder. If present, treat appropriately. If not, reassure the patient.
YES
Small painful vesicles, sometimes in clusters, or small ulcers with history of recurrent vesicles?
YES
Treat for genital herpes
NO
– Treat for syphilis AND chancroid
– In endemic areas, also treat for lymphogranuloma venereum AND/OR donovanosis
– Refer if necessary

Laboratory

Laboratory testing available in the field is of little value: e.g., in syphilis, a negative RPR or VDRL result does not exclude primary syphilis in early stage, and a positive test may reflect previous infection in a successfully treated patient.

[1] Lymphogranuloma venereum is endemic in East and West Africa, India, Southeast Asia, South America and the Caribbean. Donovanosis is endemic in South Africa, Papua New Guinea, India, Brazil and the Caribbean.

Treatment of the patient

– **Genital herpes**

- Local treatment: clean the area with soap and water, **0.5% gentian violet** can be applied for 5 days.
- Antiviral treatment: **aciclovir** PO
  In patients with a first episode, treatment may reduce the duration of symptom when given within 5 days after the onset of symptoms: 1200 mg/day in 3 divided doses for 7 days
  In patients with recurrence, give the same dose for 5 days, but treatment is only effective if initiated during the prodromal phase or within 24 hours after the onset of symptoms.
  In patients with frequent recurrences (more than 6 episodes/year), see *HIV infection and AIDS*, page 212.
- Treatment of pain: paracetamol PO

– **Syphilis**

benzathine benzylpenicillin IM: 2.4 MIU as a single dose (half the dose in each buttock)
or, for penicillin-allergic patients:
doxycycline PO: 200 mg/day in 2 divided doses for 14 days[2]
or
erythromycin PO: 2 g/day in 2 or 4 divided doses for 14 days

– **Chancroid**

azithromycin PO: 1 g as a single dose
or
ceftriaxone IM: 250 mg as a single dose
or
ciprofloxacin PO: 1 g/day in 2 divided doses for 3 days[3]
or
erythromycin PO: 2 g/day in 2 or 4 divided doses for 7 days

Fluctuant lymph nodes may be aspirated through healthy skin as required. Do not incise and drain lymph nodes.

Note: treat simultaneously for syphilis AND chancroid as both are frequent, and cannot be correctly distinguished on clinical grounds.

– **Lymphogranuloma venereum**

doxycyclin PO: 200 mg/day in 2 divided doses for 14 days[2]
or
erythromycin PO: 2 g/day in 2 or 4 divided doses for 14 days

Fluctuant lymph nodes may be aspirated through healthy skin as required. Do not incise and drain lymph nodes.

2 Doxycycline is contra-indicated in pregnant women and breast-feeding women.
3 Ciprofloxacin should be avoided in pregnant women.

– **Donovanosis**

Treatment is given for a minimum of 14 days, longer if necessary, until the complete disappearance of the lesions (otherwise risk of recurrence):
azithromycin PO: 1 g the first day then, 500 mg once daily
or
doxycyline PO: 200 mg/day in 2 divided doses[4]
or
erythromycin PO: 2 g/day in 2 or 4 divided doses

In HIV infected patients, add **gentamicin** IM: 3 to 6 mg/kg/day in 1 or 2 injections.

Treatment of the partner

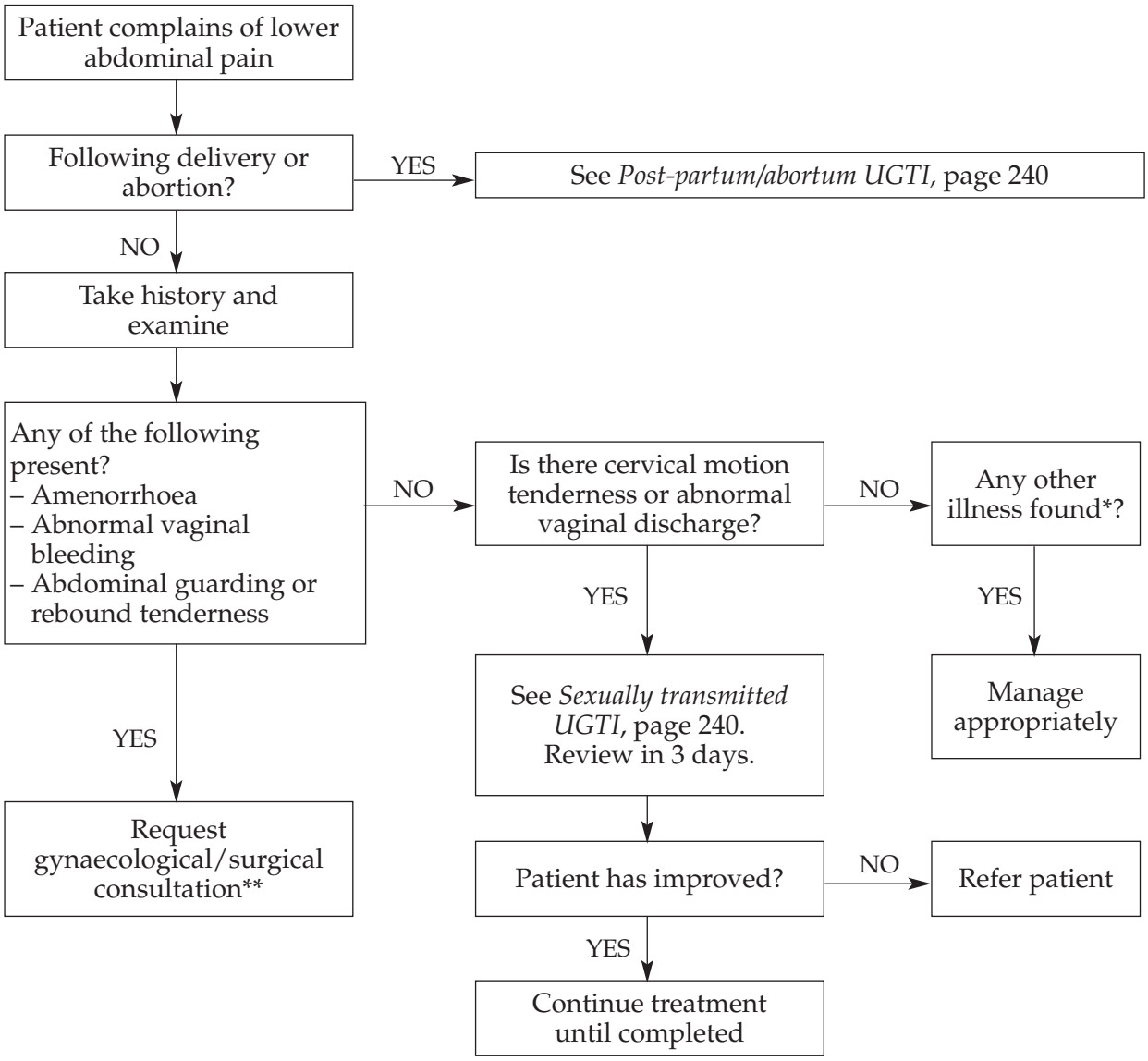
The sexual partner receives the same treatment as the patient, whether or not symptoms are present, except in the case of genital herpes (the partner is treated only if symptomatic).

4 Doxycycline is contra-indicated in pregnant women and breast-feeding women.

Lower abdominal pain in women

Upper genital tract infection (see page 240) should be suspected in women with lower abdominal pain.
Gynaecological examination should be routinely performed:
– Inspection of the vulva, speculum examination: check for purulent discharge or inflammation,
and
– Abdominal exam and bimanual pelvic exam: check for pain on mobilising the cervix.

Case management



* Look for another cause (in particular, gastrointestinal or urinary pathology).
** Look for a pregnancy related pathology (threatened abortion, extra-uterine pregnancy) or a complication (peritonitis, pelvic abscess).

Upper genital tract infections (UGTI)

Upper genital tract infections are bacterial infections of the uterus (endometritis) and/or the fallopian tubes (salpingitis), which may be complicated by peritonitis, pelvic abscess or septicaemia.
UGTI may be sexually transmitted or arise after childbirth or abortion. Antibiotic choices are directed by the most common pathogens in each scenario.
If peritonitis or pelvic abscess is suspected, request a surgical opinion while initiating antibiotic therapy.

Clinical features

Sexually transmitted infections

Diagnosis may be difficult, as clinical presentation is variable.
– Suggestive symptoms are: abdominal pain, abnormal vaginal discharge, fever, dyspareunia, menometrorrhagia, dysuria.
– Infection is probable when one or more of the above symptoms are associated with one or more of the following signs: cervical motion tenderness, adnexal tenderness, tender abdominal mass.

Infections after childbirth or abortion

– Most cases present with a typical clinical picture, developing within 2 to 10 days after delivery (caesarean section or vaginal delivery) or abortion (spontaneous or induced):
  • Fever, generally high
  • Abdominal or pelvic pain
  • Malodorous or purulent lochia
  • Enlarged, soft and/or tender uterus
– Check for retained placenta.
– In the early stages, fever may be absent or moderate and abdominal pain may be mild.

Treatment

– Criteria for hospitalisation include:
  • Clinical suspicion of severe or complicated infection (e.g. peritonitis, abscess, septicaemia)
  • Diagnostic uncertainty (e.g. suspicion of extra-uterine pregnancy, appendicitis)
  • Significant obstacles to ambulatory oral treatment
  • No improvement after 48 hours, or deterioration within 48 hours, of outpatient treatment
– All other patients may be treated on an ambulatory basis. They should be reassessed routinely on the third day of treatment to evaluate clinical improvement (decrease in

pain, absence of fever). If it is difficult to organise routine follow-up, advise patients to return to clinic if there is no improvement after 48 hours of treatment, or sooner if their condition is worsening.

Sexually transmitted infections

– Antibiotic therapy combines 3 antibiotics to cover the most frequent causative organisms: gonococci, chlamydiae, and anaerobes.
  • Ambulatory treatment:
    cefixime PO: 400 mg as a single dose or **ceftriaxone** IM: 250 mg as a single dose
    + **doxycycline** PO: 200 mg/day in 2 divided doses for 14 days[1]
    + **metronidazole** PO: 1 g/day in 2 divided doses for 14 days
  • Treatment in hospital:
    ceftriaxone IM: 250 mg/day once daily
    + **doxycycline** PO: 200 mg/day in 2 divided doses for 14 days[1]
    + **metronidazole** PO or IV: 1 g/day in 2 divided doses or infusions for 14 days
    Continue triple therapy for 24 to 48 hours after signs and symptoms have improved (resolution of fever, decrease in pain), then continue doxycycline (or erythromycin) + metronidazole to complete 14 days of treatment.
– If an IUD is in place, it should be removed (offer another method of contraception).
– Analgesic treatment according to pain intensity.
– Treatment of the partner: single dose treatment for both gonorrhoea AND chlamydia (as for *Urethral discharge*, page 231), whether or not symptoms are present.

Infections after childbirth or abortion

– Antibiotic therapy: treatment must cover the most frequent causative organisms: anaerobes, Gram negatives and streptococci.
  • Ambulatory treatment (early stages only):
    amoxicillin/clavulanic acid (**co-amoxiclav**) PO (dose expressed in amoxicillin):
    3 g/day in 3 divided doses for 7 days
    or **amoxicillin** PO: 3 g/day in 3 divided doses + **metronidazole** PO: 1.5 g/day in 3 divided doses for 7 days
  • Treatment in hospital:
    amoxicillin/clavulanic acid (**co-amoxiclav**) IV (dose expressed in amoxicillin):
    3 g/day in 3 injections + **gentamicin** IM: 5 mg/kg once daily
    or
    ampicillin IV: 6 g/day in 3 injections
    + **metronidazole** IV: 1.5 g/day in 3 infusions
    + **gentamicin** IM: 5 mg/kg once daily
    Once the patient's condition has improved and oral treatment can be tolerated, co-amoxiclav or amoxicillin + metronidazole may be given PO (as for ambulatory treatment). Stop antibiotic therapy 48 hours after resolution of fever and improvement in pain.

[1] In pregnant/breastfeeding women: **erythromycin** PO: 2 g/day in 2 to 4 divided doses for 14 days
Single dose azithromycin is not effective against chlamydia in the treatment of sexually transmitted UGTI.

In penicillin-allergic patients, use **clindamycin** (2700 mg/day in 3 divided doses or injections) + **gentamicin** (5 mg/kg once daily).

– In case of placental retention: perform digital curettage or manual vacuum extraction (refer to the MSF handbook *Obstetrics*) 24 hours after initiation of antibiotic therapy.

– Analgesic treatment according to pain intensity.

– If the patient's condition deteriorates or if fever persists after 48-72 hours of treatment, consider the possibility of complication requiring additional treatment (e.g. pelvic abscess drainage), otherwise change the antibiotic to ceftriaxone + doxycycline + metronidazole as in hospital-based treatment of sexually transmitted UGTI.

Veneral warts

Venereal warts are benign tumours of the skin or mucous membranes due to certain papilloma viruses (HPV).

Clinical features

– Venereal warts are soft, raised, painless growths, sometimes clustered (cauliflower-like appearance) or macules (flat warts), which are more difficult to discern. Warts can be external (vulva, penis, scrotum, perineum, anus) and/or internal (vagina, cervix, urethra, rectum; oral cavity in HIV infected patients).
– In women, the presence of external warts is an indication for a speculum examination to exclude vaginal or cervical warts. Speculum exam may reveal a friable, fungating tumour on the cervix, suggestive of cancer associated with papilloma virus[1].

Treatment

Choice of treatment depends on the size and location of the warts. Treatment may be less effective, and relapses more frequent, in HIV infected patients.

External warts < 3 cm and vaginal warts
podophyllotoxin 0.5%[2] solution may be self-applied by the patient, but in the event of vaginal warts, the treatment must be applied by medical staff.
Explain the procedure to the patient: apply the solution to the warts using an applicator or cotton bud, sparing the surrounding healthy skin, allow to air dry.
On vaginal warts, the solution should be allowed to dry before the speculum is withdrawn.
Apply the solution twice daily, 3 consecutive days per week, for up to 4 weeks.
Podophyllum preparations are contra-indicated in pregnant[3] or breastfeeding women. They should not be applied on cervical, intra-urethral, rectal, oral or extensive warts. Improper use may result in painful ulceration.

External warts > 3 cm; cervical, intra-urethral, rectal and oral warts; warts in pregnant or breastfeeding women
Surgical excision or cryotherapy or electrocoagulation.

1 Certain types of HPV may cause cancer. Presence of genital warts in women is an indication to screen for pre-cancerous lesions of the cervix, if feasible in the context (visual inspection with acetic acid, or cervical smear, or other available techniques), and to treat any lesions identified (cryotherapy, conisation, etc., according to diagnosis).

2 **Podophyllum 10%**, **15%** or **25% resin** is another preparation which is much more caustic, and should be applied only by medical staff. Protect the surrounding skin (vaseline or zinc oxide ointment) before applying the resin. Wash off with soap and water after 1 to 4 hours. Apply once weekly for 4 weeks.

3 Treatment of warts is not an emergency and may be deferred if alternatives to podophyllum preparations are not available. Genital warts are not an indication for caesarean section: it is uncommon for warts to interfere with delivery, and the risk of mother-to-child transmission is very low.

Major genital infections (summary)

Pathogens/ Infections	Clinical features	Laboratory	Treatment
Neisseria gonorrhoeae (gonorrhoea)	– In women: • vaginal discharge, cervicitis (mucopurulent cervical discharge), dysuria (50% of infections are asymptomatic); • UGTI (salpingitis, endometritis). – In men: purulent urethral discharge and sometimes dysuria (5 to 50% of infections are asymptomatic).	– In women: not valid (not sensitive). – In men: Gram or methylene blue stain: intracellular diplococci and polymorphonuclear leucocytes (more than 4 per field).	**cefixime** PO: 400 mg as a single dose or **ceftriaxone** IM: 250 mg as a single dose Treat also for chlamydia. In case of UGTI, see page 240.
Chlamydia trachomatis (chlamydia)	– In women: • vaginal discharge, cervicitis, and rarely dysuria (> 50% of infections are asymptomatic); • UGTI (salpingitis, endometritis). – In men: mild urethral discharge and/or dysuria but up to 90% of infections are asymptomatic.	The best method is PCR (not feasible under field conditions).	**azithromycin** PO: 1 g as a single dose or **doxycycline** PO[1]: 200 mg/day for 7 days Treat also for gonococcal infection (except when a Gram stain in males shows no *N. gonorrhoeae*). In case of UGTI, see page 240.
Trichomonas vaginalis (trichomoniasis)	– In women: yellow-green vaginal discharge, sometimes foul smelling, vulvar irritation (10 to 50% of infections are asymptomatic). – In men: most infections are asymptomatic. Can produce balanitis, urethritis with mild discharge and sometimes dysuria.	– Wet mount of fresh vaginal fluid shows motile trichomonas (low sensitivity). – pH of urethral/vaginal fluid > 4.5	**tinidazole** or **metronidazole** PO: 2 g as a single dose
Bacterial vaginosis (*Gardnerella vaginalis* and other associated bacteria)	Diagnosis is made in the presence of 3 of the following 4 signs: – Homogenous grey-white adherent vaginal discharge – pH of vaginal fluid > 4.5 – Vaginal fluid has an amine (fishy) odour, especially when mixed with 10% KOH – Presence of clue cells in wet mount or Gram stain of vaginal fluid		**tinidazole** or **metronidazole** PO: 2 g as a single dose
Candida albicans (candidiasis)	– Mainly seen in women: pruritus and vulvovaginitis, frequently creamy-white vaginal discharge, sometimes dysuria. – In men: balanitis/balanoposthitis (inflammation of the glans/prepuce, erythema, pruritus, white pustules) and rarely urethritis	– Saline of KOH wet mount of fresh vaginal fluid shows budding yeast cells and pseudohyphae. – pH of vaginal fluid: normal	– In women: **clotrimazole** 500 mg: one vaginal tablet as a single dose or **clotrimazole** 100 mg: one vaginal tablet/day for 6 days or **nystatin** 100,000 IU: one vaginal tablet/day for 14 days – In men: **miconazole 2%** cream: 2 applications daily for 7 days

Pathogens/ Infections	Clinical features	Laboratory	Treatment
Herpes simplex virus type 2 (genital herpes)	Many asymptomatic carriers. Multiple vesicles on genitals leading to painful ulcerations. In women, affects vulva, vagina and cervix; in males, penis and sometimes urethra. In primary episodes, fever (30%) and lymphadenopathy (50%). Recurrences in 1/3 of infections with shorter and milder symptoms.	Diagnosis by culture, serology and PCR done exclusively at a reference laboratory.	Analgesics, local disinfection. If available, **aciclovir** PO: – Primary episode: 1200 mg/day for 7 days, given within 5 days after onset of lesions. – Recurrent infections: same dose for 5 days, given within 24 hours after onset of lesions.
Treponema pallidum (syphilis)	Single firm painless genital ulcer, often unnoticed.	RPR/VDRL lack sensitivity and specificity, but may be useful for following treatment effectiveness (decrease in titer) or confirming re-infection (rise in titer). Treponemic tests (TPHA, FTA, rapid tests such as SD Bioline®) are more sensitive and specific.	**benzathine benzylpenicillin** IM: 2.4 MIU as a single dose For penicillin-allergic patients: **doxycycline** PO[1]: 200 mg/day for 14 days or **erythromycin** PO: 2 g/day for 14 days Treat also for chancroid.
Haemophylus ducreyi (chancroid)	Painful single (or multiple) genital ulcer (soft chancre, bleeds easily when touched). Painful and voluminous inguinal lymphadenitis in 50%. Fistulae develop in 25% of cases.	*H. ducreyi* bacillus is difficult to identify on microscopy or by culture.	**azithromycin** PO: 1 g as a single dose or **ceftriaxone** IM: 250 mg as a single dose or **ciprofloxacin** PO[2]: 1 g/day for 3 days or **erythromycin** PO: 2 g/day for 7 days Treat also for syphillis.
Human papillomavirus (venereal warts)	Soft, raised, painless growths, sometimes clustered (acuminate condyloma) or macules (flat warts). Warts can be external (vulva, penis, scrotum, perineum, anus) and/or internal (vagina, cervix, urethra, rectum; oral cavity in HIV infected patients).	The diagnosis is based on clinical features. It feasible in the context, the presence of genital warts in women in an indication to screen for pre-cancerous lesions of the cervix (visual inspection with acetic acid, or cervical smear, or other available techniques).	– External warts < 3 cm and vaginal warts: **podophyllotoxin 0.5%** – External warts > 3 cm ; cervical, intra-urethral, rectal and oral warts; warts in pregnant or breastfeeding women: surgical excision or cryotherapy or electrocoagulation.

[1] Doxycycline is contra-indicated in pregnant women. It should not be administered to breast-feeding women if the treatment exceeds 7 days (use erythromycin).

[2] Ciprofloxacin should be avoided in pregnant women.

Metrorrhagia

Genital bleeding unrelated to the menstrual period. In women of childbearing age, always assess if the bleeding is related to a pregnancy.

In all events

– Rapidly assess the severity of bleeding.
– In the event of heavy haemorrhage or shock or if a surgical intervention (laparotomy, caesarean delivery) is required:
  • Start an IV infusion of Ringer lactate; monitor vital signs (pulse, BP);
  • Prepare for a possible blood transfusion (determine patient's group, identify potential donors);
  • If a transfusion is performed, only use blood that has been screened at least for HIV, hepatitis B, and hepatitis C.
– In the event of referral to a surgical facility, difficult transport conditions might aggravate the haemorrhage: the patient should be infused and accompanied by family members who are potential blood donors.
– Ultrasound is not imperative but it facilitates certain diagnoses (e.g. ectopic pregnancy, placenta praevia).
– Prevent or treat anaemia.

Bleeding unrelated to pregnancy

– Bimanual pelvic examination and speculum examination:
  • determine the origin of the bleeding [vagina, cervix, uterine cavity]; appearance of the cervix;
  • look for uterine motion tenderness, increased volume or abnormalities of the uterus.
– Friable, hard, ulcerated, hypertrophic mass on the cervix: possible cervical cancer (surgical treatment).
– Inflammation of the cervix, light bleeding, purulent cervical discharge, moderate or no pelvic pain, no fever: cervicitis (see *Abnormal vaginal discharge*, page 233).
– Inflammation of the cervix, uterine motion tenderness, purulent cervical discharge, bleeding light to moderate, pelvic pain, with or without fever: salpingitis (see *Upper genital tract infections*, page 240).
– Enlarged, misshapen uterus: uterine fibroids (only consider surgery if large fibroids cause significant bleeding).
– Normal uterus and cervix: consider poorly tolerated contraceptives; endometrial cancer (particularly in postmenopausal women); urinary schistosomiasis in sub-Saharan Africa (page 151).

Bleeding during the first half of pregnancy

The two diagnoses to firstly consider are ectopic pregnancy and abortion.

Ectopic pregnancy

Pregnancy that develops outside the uterus, very often in a fallopian tube. Ectopic pregnancy should be suspected in any woman of reproductive age with pelvic pain and/or metrorrhagia. There are many possible clinical presentations and these can mislead diagnosis towards appendicitis, intestinal obstruction, salpingitis or abortion. The major risk of ectopic pregnancy is rupture, leading to intra abdominal haemorrhage.

Clinical signs and diagnosis

- Amenorrhoea (may be absent) or menstrual irregularity.
- Dark slight bleeding or light to heavy bright red bleeding; or haemorrhagic shock with light bleeding not corresponding to the severity of shock (intra-abdominal haemorrhage).
- Pelvic pain; sometimes distended abdomen, rebound tenderness.
- On pelvic examination: tender adnexal mass; exquisite pain in the Pouch of Douglas (haemoperitoneum); closed cervix.
- The diagnosis of pregnancy is confirmed by a positive rapid pregnancy test (urinary test) but a negative test does not rule out an ectopic pregnancy.
- If ultrasound is available, the presence of an intra-uterine pregnancy eliminates the diagnosis of an ectopic pregnancy. If ultrasound shows an empty uterus together with intra peritoneal effusion, an ectopic pregnancy is likely, especially if the pregnancy test is positive.

Management

If in doubt (negative pregnancy test, no sign of rupture and stable haemodynamic conditions), hospitalise the patient for surveillance, if possible in a surgical facility. Otherwise, refer immediately for emergency laparotomy.

Threatened abortion

Clinical signs

In a context of amenorrhoea: slight, bright red bleeding; pelvic pain; closed cervix.

Management

- Look for foreign bodies or vaginal wound consistent with induced abortion; remove foreign bodies, clean the wound; update tetanus immunization (page 170).
- Treat pain: paracetamol or antispasmodics PO.
- Place the patient on rest.

Abortion

Clinical signs

Slight or significant bright red bleeding; expulsion of the embryo, membranes or products; uterine contractions; open cervix.

Management

– Look for foreign bodies or vaginal wound consistent with induced abortion; remove foreign bodies, clean the wound; update tetanus immunization (page 170).

– Treat pain: paracetamol or antispasmodics.

– Depending on the stage of pregnancy:

Before 10 weeks of pregnancy: abortion is likely to be complete. Monitor, only intervene in the event of heavy bleeding (aspiration).

Between 10 and 12 weeks of pregnancy: uterine evacuation is often necessary.

- Manual vacuum aspiration is the method of choice (easier to perform, less traumatic and less painful than curettage).
- Administration of **misoprostol** (600 µg PO as a single dose) can be used to avoid instrumental evacuation but carries a risk of failure. It is essential to check if the uterus is empty a few days after administration. If the treatment has failed, instrumental evacuation is unavoidable.

After 12 weeks of pregnancy: labour should be allowed to progress, do not rupture the membranes. The placenta is usually evacuated with the foetus. If evacuation is incomplete or in the event of haemorrhage, perform manual removal immediately after the expulsion, before the uterus retracts or the cervix closes. If manual removal is delayed, curettage must be performed which carries a high risk of uterine perforation.

– In the event of post-abortion infection (pelvic pain, uterine tenderness, foul-smelling vaginal discharge): antibiotic treatment, see *Upper genital tract infections*, page 241.

Bleeding during the second half of pregnancy

Three conditions –placenta praevia, abruptio placentae, and uterine rupture–can quickly become life-threatening to both mother and child. These conditions must be referred to surgical facilities.

When no cause for the bleeding is found, consider the possibility of premature labour.

Placenta praevia

Placenta that covers either entirely or partially the internal os of the cervix. Placenta praevia may give rise to bleeding during the third trimester and carries a high risk of haemorrhage during delivery.

Clinical signs and diagnosis

– Sudden, painless, slight or significant bright red bleeding.
– The vaginal exam must be done with extreme care to avoid triggering massive bleeding: uterus is soft; the exam may reveal displacement of the cervix and deformation of the lower uterine segment by the placenta praevia; if the cervix is dilated, the placenta can be felt in the cervix. Do not repeat the examination.
– If ultrasound is available, vaginal examination can be avoided.

Management

– If labour has not yet started and bleeding is light: bed rest and monitoring.
– If labour has started and/or bleeding is heavy: refer to surgical facility.

Abruptio placenta

Haematoma that forms between the placenta and the uterine wall as a result of separation of the placenta, prior to foetal expulsion.

Clinical signs

– Dark slight bleeding, sometimes absent, or shock not always consistent with the external blood loss as bleeding is internal.
– Sudden, severe, continuous abdominal pain.
– Tightly contracted uterus; often, foetal heart sounds absent (foetal death).
– Often occurs in a context of pre-eclampsia.

Management

Refer to surgical facility.

Uterine rupture

Tear in the uterine wall, in most cases during labour, often related to inappropriate use of oxytocin.

Clinical signs

– Impending rupture: prolonged labour, agitation, alteration of the general state, poor uterine relaxation, continuous abdominal pain, more severe than the contractions.
– Rupture: disappearance of uterine contractions, shock; sometimes, palpation of the dead foetus expelled into the maternal abdomen.

Management

Refer to surgical facility for emergency laparotomy.

Premature labour

Clinical signs

Cervical changes (effacement and dilatation) and regular uterine contractions before 37 weeks LMP. Metrorrhagia are not always present in premature labour. If present, blood loss is usually minimal.

Management

– Strict bed rest.
– Allow labour to progress in the following cases: gestation is more than 37 weeks; the cervix is more than 3-4 cm dilated; there is significant bleeding; the foetus is distressed or dead; there is amnionitis or pre-eclampsia.
– Otherwise, tocolysis:
  As first-line treatment, **nifedipine** PO (short-acting capsule): 10 mg by oral route, to be repeated every 15 minutes if uterine contractions persist (maximum 4 doses or 40 mg), then 20 mg every 6 hours for 48 hours.

or, if not available,
salbutamol IV infusion for 48 hours maximum: dilute 5 mg (10 ampoules of 0.5 mg) in 500 ml of 5% glucose or 0.9% sodium chloride to obtain a solution of 10 micrograms/ml.
Start infusion at the rate of 15 to 20 micrograms/minute (30 to 40 drops/minute).
If contractions persist, increase the rate by 10 to 20 drops/minute every 30 minutes until uterine contractions cease. Do not exceed 45 micrograms/minute (90 drops/minute).
Continue for one hour after contractions have ceased, then reduce the rate by half every 6 hours.
Monitor maternal pulse regularly, decrease the infusion rate in the event of maternal tachycardia (> 120/minute).

Do not combine nifedipine and salbutamol.

Either tocolysis is effective and contractions cease or diminish: in both cases, do not prolong treatment over 48 hours. Bed rest until the end of pregnancy.
Or tocolysis is not effective, contractions persist and labour begins: take necessary steps for a premature birth.

Post-partum haemorrhage

Clinical signs

Haemorrhage, exceeding the usual 500 ml of a normal placental delivery that occurs in the first 24 hours (usually immediately) following the delivery of the child. Post-partum haemorrhage is mainly due to placental retention and uterine atonia, but may also result from uterine rupture or cervical or vaginal lacerations.

Management

- If systolic BP is < 90 mmHg, elevate the legs (keep or replace the patient's feet in the delivery table stirrups).
- Under general anaesthesia and antibiotic prophylaxis (**ampicillin** or **cefazolin** IV, 2 g as a single dose): manual removal of the placenta (if not yet delivered) and systematic manual exploration of the uterus to remove any clots/placental debris and to make sure the uterus has not ruptured.
- Then **oxytocin**: 10 IU diluted in 500 ml of Ringer lactate, at a rate of 80 drops/minute. At the same time, administer 5 to 10 IU by IV push, to be repeated if necessary until retraction of uterus, without exceeding a total dose of 60 IU.
- Massage of the uterus to expel any clots and aid uterine retraction.
- Continue monitoring (pulse, BP, blood loss). Bleeding should diminish and the uterus should remain firm.
- Measure haemoglobin.
- Insert a urinary catheter to facilitate uterine retraction.

For more information on the management of pregnancy-related bleeding, refer to the MSF handbook, *Obstetrics in remote settings*.

Th.A-Chapter 10 27/01/10 14:45 Page 251

CHAPTER 10

Medical and minor surgical procedures

Dressings 253

Treatment of a simple wound 256

Burns 266

Abscesses 274

Pyomyositis 279

Leg ulcers 281

Venomous bites and stings 283

Dental infections 287

Th.A-Chapter 10 27/01/10 14:45 Page 253

Dressings

– The objective of dressing wounds is to promote healing. The procedure includes cleaning, disinfection and protection of the wound while respecting the rules of hygiene.

– Not all wounds need to be covered by a dressing (e.g. a clean wound that has been sutured for several days; a small dry wound not requiring sutures).

Material

– **Sterile instruments**
  • one Kocher or Pean forceps
  • one dissecting forceps
  • one pair of surgical scissors or one scalpel to excise necrotic tissue and to cut gauze or sutures

  Instruments for **one** dressing for **one** patient must be wrapped together in paper or fabric (or can be placed in a metallic box) and sterilised together to limit handling and breaks in asepsis. 5 to 10 compresses may be included in this set.
  If there are no sterile instruments, a dressing can be done using sterile gloves.

– **Renewable supplies**
  • sterile compresses
  • non-sterile disposable gloves
  • adhesive tape and/or crepe or gauze bandage
  • sterile 0.9% sodium chloride or sterile water
  • depending on the wound: antiseptic (polyvidone iodine scrub solution, polyvidone iodine dermal solution), paraffin compresses, analgesics

Organisation of care

Proper organization of care helps maintain the rules of asepsis and decreases the risk of contamination of the wound or transmission of organisms from one patient to another:

– Assign one room for dressings. It must be cleaned and the waste removed every day. The dressing table must be disinfected after each patient.

– Dressings may be applied at the bedside if the patient's condition requires. Use a clean, disinfected dressing trolley with: on the upper tray, sterile and/or clean material (dressing set, extra compresses, etc.) and on the lower tray, septic material (container for contaminated instruments, sharps disposal container and a container or garbage bag for waste).

– Prepare all the necessary material in a well lit area. If necessary, arrange for an assistant to be present.

– Wear protective glasses if there is a risk of projection from an oozing wound.

Th.A-Chapter 10 27/01/10 14:45 Page 254

– Always proceed from clean to dirty: start with patients with uninfected wounds. If there are multiple dressings for one patient, start with the cleanest wound.

Technique

– If the procedure may be painful, give an analgesic and wait the necessary time for the drug to take effect before starting the procedure.
– Settle the patient comfortably in an area where his privacy is respected throughout the procedure.
– Explain the procedure to the patient and obtain his co-operation.
– Instruments (or sterile gloves) must be changed between patients.
– To prevent drug interactions, use the same antiseptic for all care of one patient.

Removal of an old dressing

– Wash hands (ordinary soap) or disinfect them with an alcohol-based hand rub.
– Put on non-sterile gloves and remove the adhesive tape, bandage and superficial compresses.
– Proceed gently with the last compresses. If they stick to the wound, loosen them with 0.9% sodium chloride or sterile water before removal.
– Observe the soiled compresses. If there is significant discharge, a greenish colour or a foul odour, a wound infection is likely.
– Discard the dressing and the non-sterile gloves in the waste container.

Observe the wound

– In the case of an open wound, loss of cutaneous tissue or ulcer, the colour is an indicator of the stage in the healing process:
  • **black** area = necrosis, wet or dry infected eschar
  • **yellow** or **greenish** area = infected tissue and presence of pus
  • **red** area = granulation, usually a sign of healing (unless there is hypertrophy), however, red edges indicate inflammation or infection
  • **pink** area = process of epithelisation, the final stage of healing that begins at the edges of the wound
– In the case of a sutured wound, the existence of local signs of suppuration and pain requires the removal of one or more sutures to avoid the infection spreading. Local signs include:
  • red, indurated and painful edges
  • drainage of pus between the sutures, either spontaneously or when pressure is applied on either side of the wound
  • lymphangitis
  • sub-cutaneous crepitations around the wound

In any case, if local signs of infection are observed, look for general signs of infection (fever, chills, changes in the overall condition).

Th.A-Chapter 10 27/01/10 14:45 Page 255

Technique for cleaning and dressing of the wound

– Wash hands again or disinfect them with an alcohol-based hand rub.

– Open the dressing set or box after checking the date of sterilisation and that the wrapping is intact.

– Pick up one of the sterile forceps being careful not to touch anything else.

– Pick up the second forceps with the help of the first one.

– Make a swab by folding a compress in 4 using the forceps.

– **Clean sutured wound or clean open wound with red granulation:**
  • clean with 0.9% sodium chloride or sterile water to remove any organic residue; work from the cleanest to the dirtiest area (use a clean swab for each stroke);
  • dab dry with a sterile compress;
  • re-cover a sutured wound with sterile compresses or an open wound with paraffin compresses; the dressing should extend a few cm beyond the edges of the wound;
  • keep the dressing in place with adhesive tape or a bandage.

– **Necrotic or infected open wounds:**
  • clean with polyvidone iodine (7.5% scrub solution, 1 part of solution + 4 parts of sterile 0.9% sodium chloride or sterile water). Rinse thoroughly then dab dry with a sterile compress; or if not available, sterile 0.9% sodium chloride or sterile water and apply an antiseptic (10% polyvidone iodine dermal solution).
  • apply sterile vaseline and remove all necrotic tissue at each dressing change until the wound is clean.

– Discard any sharp materials used in an appropriate sharps container and the rest of the waste in a waste container.

– As quickly as possible, soak the instruments in disinfectant.

– Wash hands again or disinfect them with an alcohol-based hand rub.

The principles remain the same if the dressing is done using instruments or sterile gloves.

Subsequent dressings

– Clean, sutured wound: remove the initial dressing after 5 days if the wound remains painless and odourless, and if the dressing remains clean. The decision to re-cover or to leave the wound uncovered (if it is dry) often depends on the context and local practices.

– Infected, sutured wound: remove one or more sutures and evacuate the pus. Change the dressing at least once daily.

– Open, dirty wound: daily cleaning and dressing change.

– Open granulating wound: change the dressing every 2 to 3 days, except if the granulation is hypertrophic (in this case, apply local corticosteroids).

Th.A-Chapter 10 27/01/10 14:45 Page 256

Treatment of a simple wound

– A simple wound is a break in the continuity of the skin limited in depth at the subcutaneous fatty tissue, that does not affect the underlying structures (muscle, bone, joints, major arteries, nerves, tendons) and without significant loss of tissue.

– The goal of treatment is to assure rapid healing of the wound without complications or sequelae. Several basic rules apply:
  • rapidly treat wounds, while maintaining the rules of asepsis and the order of the initial procedures: cleaning-exploration-excision;
  • identify wounds that need to be sutured and those for which suturing would be harmful or dangerous;
  • immediately suture recent, clean, simple wounds (less than 6 hours old) and delay suturing contaminated wounds and/or those more than 6 hours old;
  • prevent local (abscess) or general (gas gangrene; tetanus) infections.

Material

Instruments (Figures 1a to 1d)

– One dissecting forceps, one needle-holder, one pair of surgical scissors and one Pean or Kocher forceps are usually enough.

– One or two other artery forceps, a pair of Farabeuf retractors and a scalpel may be useful for a contused or deep wound.

Instruments to suture one wound for one patient must be packaged and sterilised together (suture box or set) to limit handling and breaks in asepsis.

Renewable supplies

– For local anaesthesia: sterile syringe and needle; **1% lidocaine** (without epinephrine)

– Sterile gloves, fenestrated sterile towel

– Sterile absorbable and non-absorbable sutures

– Antiseptic and supplies for dressings

– For drainage: corrugated rubber drain or equivalent, nylon suture

Th.A-Chapter 10 27/01/10 14:45 Page 257

Technique

– Settle the patient comfortably in an area with good lighting and ensure all the necessary material is prepared.

– Explain the procedure to the patient and ensure his co-operation.

– If the patient is a young child, arrange to have an assistant hold the child if necessary.

Initial cleaning

– Wear suitable clothing: sterile gloves for all wounds and a gown and protective glasses if there is a risk of projection from a bleeding wound.

– Start by washing the wound, prolong the cleaning if the wound is particularly soiled. Use ordinary soap or **polyvidone iodine scrub solution** and water and rinse.

– If necessary use a sterile brush. Cleaning with running water is preferable to cleaning by immersion.

– If the wound is infected and the patient has general signs of infection (fever, chills, changes in the overall condition) systemic antibiotic therapy may be required. Administer antibiotics at least one hour prior to starting care.

Exploration

– Wash hands and put on sterile gloves.

– Disinfect the wound and surrounding area with **10% polyvidone iodine**.

– Cover the wound with a fenestrated sterile towel.

– Local anaesthetic: infiltrate **1% lidocaine** into the edges of the wound and wait at least 2 minutes for the anaesthetic to take effect.

– Proceed carefully from the superficial to the deepest parts of the wound to explore the extent of the wound, if necessary, aided by an assistant.

– Consider the anatomical location of the wound and look for injury to any underlying structures (the clinical examination of a limb must include evaluation of sensitivity and motor functioning, as well as that of tendons in order to orient surgical exploration):
  • a wound that communicates with a fracture is an open fracture,
  • a wound close to a joint may be a joint wound,
  • a wound on the hands or feet may affect the nerves and/or tendons.

– Look for and remove any foreign bodies.

– In the event of significant pain or bleeding, the exploration must be completed in an operating room.

Th.A-Chapter 10 27/01/10 14:45 Page 258

Wound excision

– The goal of the excision is to remove non-viable tissue, which favours the proliferation of bacteria and infection.
– The wound may require little or no excision if it is clean. The excision is more extensive if the wound is bruised, irregular or extensive.
– Limit excision of the skin around the wound, particularly in facial wounds.
– Sub-cutaneous fat and tissue of doubtful viability should be generously excised in order to leave only well vascularised tissue.

Immediate suturing of a simple wound

– Immediate suturing may have serious consequences for the patient if precautions to prevent infection and promote healing are not taken.
– The decision to suture immediately can only be taken after the cleaning, exploration and satisfactory excision, and if the following conditions are met: simple wound, no more than 6 hours old with no devitalised or contused tissue (the wound may be as long as 24 hours old if on the face, scalp, upper limbs or hands).
– Bites (for local treatment see *Rabies*, page 194) and bullet, shell or mine shrapnel wounds should not be immediately sutured.

Delayed suturing of a simple wound

– Wounds that do not fill the above conditions should not be immediately sutured.
– After cleaning, exploration and excision a simple dressing is applied to the open wound.
– Further cleaning and removal of any remaining necrotic tissue is completed with daily dressing changes.
– If after 72 hours there are no signs of local infection, the wound may be sutured.

Healing by second intention of infected wounds

If the wound does not meet the conditions of cleanliness described above, the wound cannot be sutured. It will heal either spontaneously (healing by secondary intention), or will require a skin graft (once the wound is clean) if there is significant loss of tissue.

Th.A-Chapter 10 27/01/10 14:45 Page 259

Figure 1a
Kocher forceps,
straight, toothed

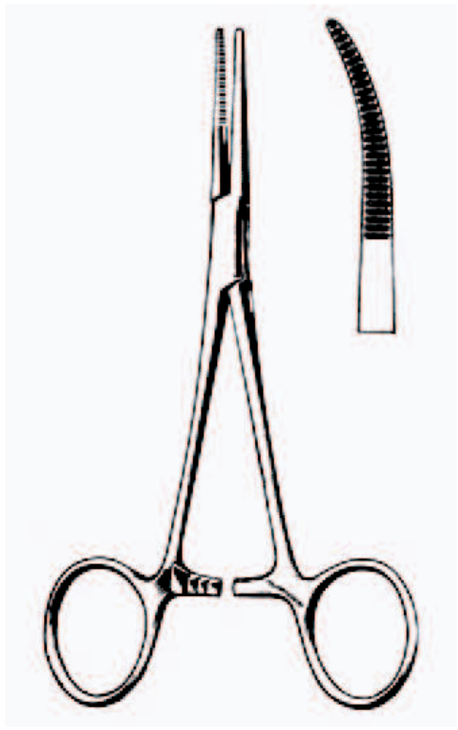


Figure 1b
Kelly forceps,
curved, non-toothed

Figure 1c
Small artery forceps,
curved, non-toothed

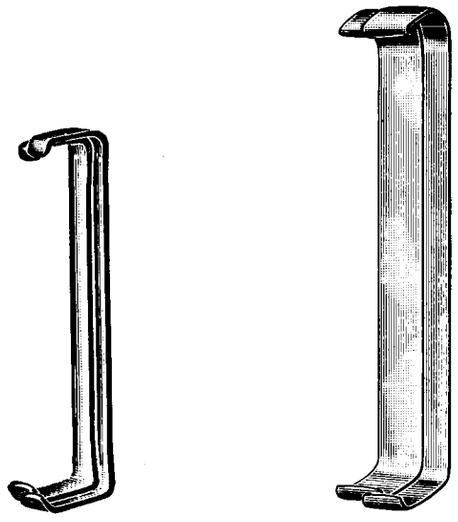


Figure 1d
Farabeuf retractors

Figures 1: *Basic instruments*

Th.A-Chapter 10 27/01/10 14:45 Page 260

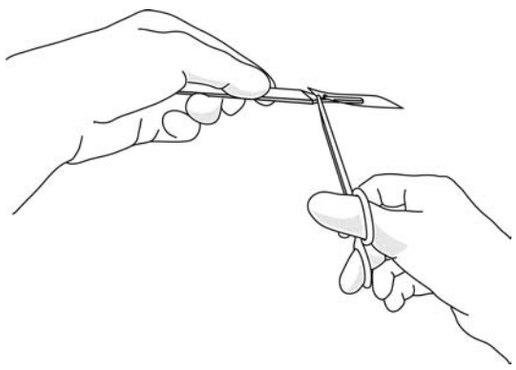


Figure 2a
Always mount a surgical blade using a needle holder.
Change the blade for each new procedure.

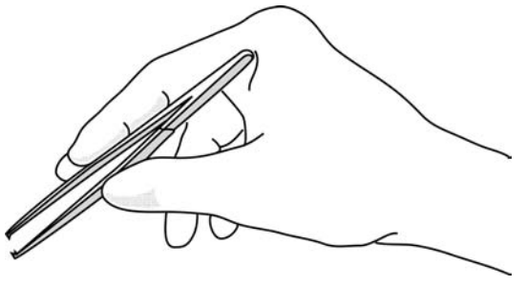


Figure 2b
Dissecting forceps should not be held in the palm of the hand, but rather between the thumb and index finger. Toothed dissecting forceps should only be used on skin.

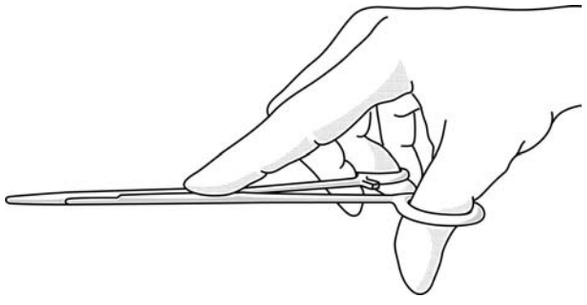


Figure 2c
Insert the thumb and the ring finger into the handle of a needle holder (or scissors), and stabilize the instrument using the index finger.

Figures 2: *How to hold instruments*

Th.A-Chapter 10 27/01/10 14:45 Page 261

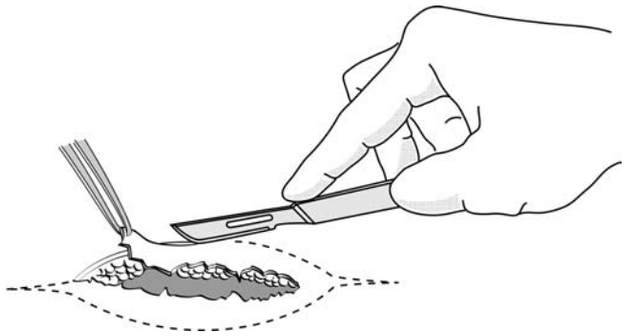


Figure 3a
Debridement of a contused, ragged wound: straightening of the wound edges with a scalpel. Be conservative in facial wounds.

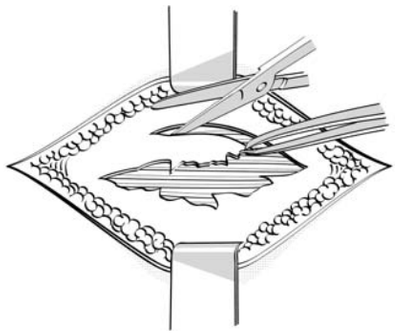


Figure 3b
Excision of edges of the aponeurosis to prevent necrosis

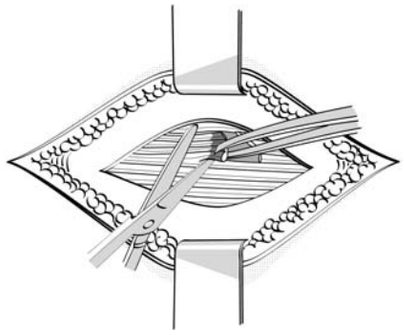


Figure 3c
Excision of contused muscle

Figures 3: *Wound debridement*
This should be done sparingly, limited to excision of severely contused or lacerated tissue that is clearly becoming necrotic.

Th.A-Chapter 10 27/01/10 14:45 Page 262

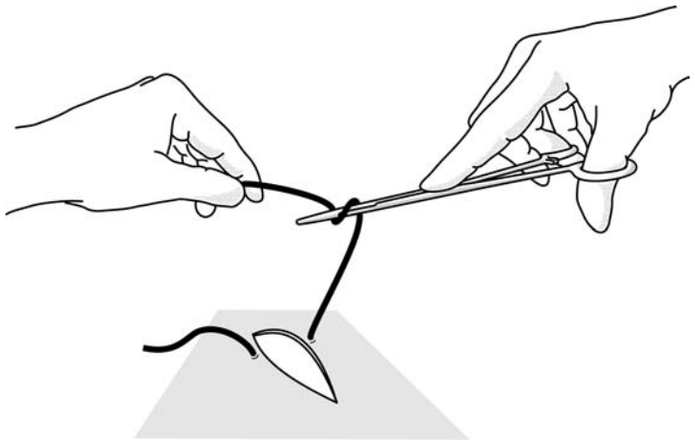


Figure 4a
Loop the suture around the needle holder in one direction and remember the direction of the loop. Grasp the loose end with the needle holder and pull it through the loop to make the first knot. Lower the knot so that it closes the wound.

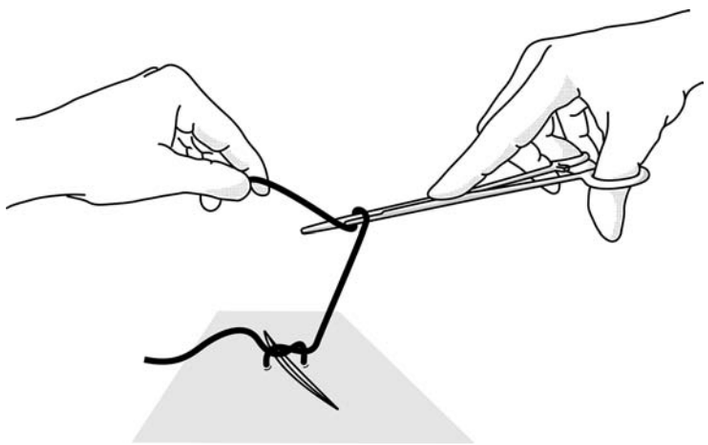


Figure 4b
The second loop should be in the opposite direction. At least 3 knots are needed to make a suture, alternating from one direction to the other.

Figure 4c
In principle the first knot lies flat.

Figure 4d
Second knot in the opposite direction.

Figures 4: *Practising making knots using forceps*

Th.A-Chapter 10 27/01/10 14:46 Page 263

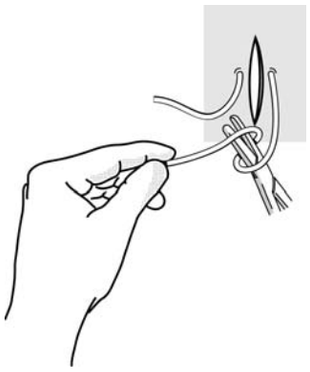


Figure 4e

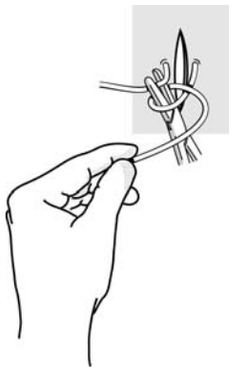


Figure 4f

Grasp the loose end with the needle holder.

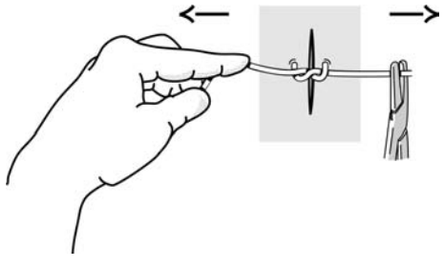


Figure 4g

First flat knot

Slide the knot towards the wound using the hand holding the loose end while holding the other end with the needle holder. Tighten the knot without causing tissue ischaemia.

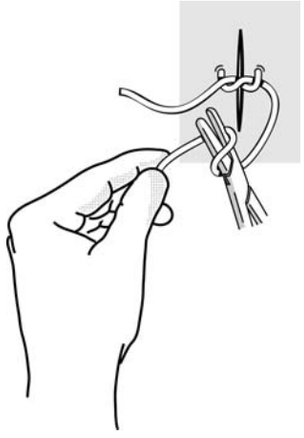


Figure 4h

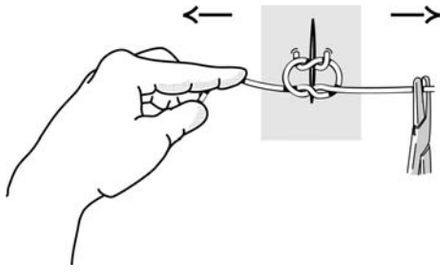


Figure 4i

Second knot in the opposite direction

Figures 4: *Practising making knots using forceps* (continued)

Th.A-Chapter 10 27/01/10 14:46 Page 264

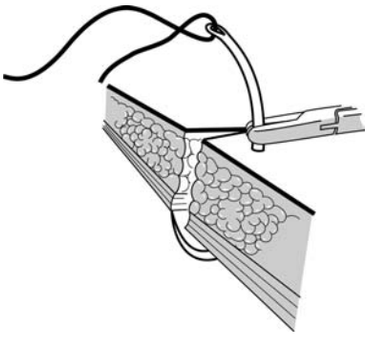


Figure 5a

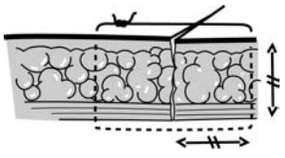


Figure 5b

The suture should be as deep as it is wide.

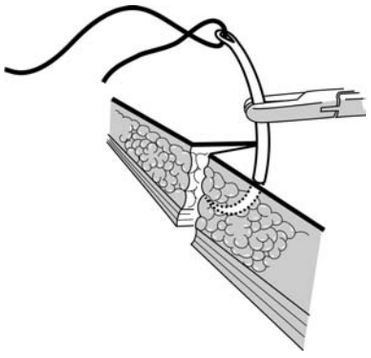


Figure 5c

Figure 5d

The suture is too shallow, the edges are invaginated.

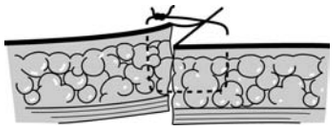


Figure 5e

Poor lining of the edges

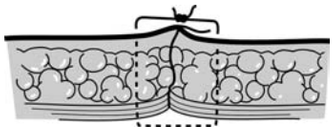


Figure 5f

Do not make the knot directly over the wound.

Figures 5: *Particular problems*

Th.A-Chapter 10 27/01/10 14:46 Page 265

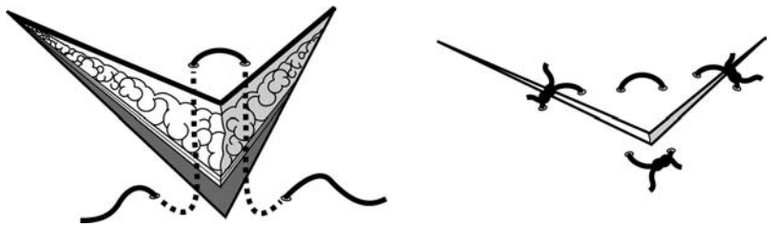


Figure 6: *Closing a corner*

Figure 7: *Closure of the skin, simple interrupted sutures with non-absorbable sutures*

Th.A-Chapter 10 27/01/10 14:46 Page 266

Burns

Burns are cutaneous lesions caused by exposure to heat, electricity, chemicals or radiation. They cause significant pain and may threaten survival and/or compromise function.

Classification of burns

Severe burns: one or more of the following parameters:
– Involving more than 10% of the body surface area (BSA) in children and 15% in adults
– Inhalation injury (smoke, hot air, particles, toxic gas, etc.)
– Major concomitant trauma (fracture, head injury, etc.)
– Location: face, hands, neck, genitalia/perineum, joints (risk of functional deficit)
– Electrical and chemical burns or burns due to explosions
– Age < 3 years or > 60 years or significant co-morbidities (e.g. epilepsy, malnutrition)

Minor burns: involving less than 10% of the BSA in children and 15% in adults, in the absence of other risk factors.

Evaluation of burns

Extent of burns

Lund-Browder table – Percentage of body surface area according to age

Location	< 1 year	1-4 years	5-9 years	10-15 years	Adults
Head	19	17	13	10	7
Neck	2	2	2	2	2
Anterior trunk	13	13	13	13	13
Posterior trunk	13	13	13	13	13
Right buttock	2.5	2.5	2.5	2.5	2.5
Left buttock	2.5	2.5	2.5	2.5	2.5
Perineum/genitalia	1	1	1	1	1
Right upper arm	4	4	4	4	4
Left upper arm	4	4	4	4	4
Right lower arm	3	3	3	3	3
Left lower arm	3	3	3	3	3
Right hand	2.5	2.5	2.5	2.5	2.5
Left hand	2.5	2.5	2.5	2.5	2.5
Right thigh	5.5	6.5	8.5	8.5	9.5
Left thigh	5.5	6.5	8.5	8.5	9.5
Right leg	5	5	5.5	6	7
Left leg	5	5	5.5	6	7
Right foot	3.5	3.5	3.5	3.5	3.5
Left foot	3.5	3.5	3.5	3.5	3.5

Th.A-Chapter 10 27/01/10 14:46 Page 267

This table helps to accurately calculate the % of BSA involved according to patient's age: e.g. burn of the face, anterior trunk, inner surface of the lower arm and circumferential burn of left upper arm in a child 2 years of age: 8.5 + 13 + 1.5 + 4 = 27% BSA.

Depth of burns

Apart from first-degree burns (painful erythema of the skin and absence of blisters) and very deep burns (third-degree burns, carbonization), it is not possible, upon initial examination, to determine the depth of burns. Differentiation is possible after D8-D10.

	Superficial burn on D8-D10	**Deep burn on D8-D10**
Sensation	Normal or pain	Insensitive or diminished sensation
Colour	Pink, blanches with pressure	White, red, brown or black Does not blanch with pressure
Texture	Smooth and supple	Firm and leathery
Appearance	Minimal fibrinous exudate Granulation tissue evident Bleeds when incised	Covered with fibrinous exudate Little or no bleeding when incised
Healing	Heals spontaneously within 5-15 days	– Very deep burn: always requires surgery (no spontaneous healing) – Intermediate burn: may heal spontaneously in 3 to 5 weeks; high risk of infection and permanent sequelae

Evaluation for the presence of inhalation injury

Dyspnoea with chest wall indrawing, bronchospasm, soot in the nares or mouth, productive cough, carbonaceous sputum, hoarseness, etc.

Treatment of severe burns *(in hospital)*

I. Initial management

On admission

– Ensure airway is patent; high-flow oxygen, even when SaO_2 is normal.
– Establish intravenous access, through unburned skin if possible (intraosseous access if venous access is not possible).
– **Ringer lactate** (RL): 20 ml/kg during the first hour, even if the patient is stable.
– **Morphine** SC: 0.2 mg/kg (Step 1 and Step 2 analgesics are not effective).
– In the event of chemical burns: flush with copious amounts of water for 15 to 30 min, avoiding contamination of healthy skin; do not attempt to neutralize the chemical agent.

Once the patient is stabilized

– Remove clothes if they are not adherent to the burn.
– Take history of the burn injury: mechanism, causative agent, time, etc.
– Assess the burn injury: extent, depth, carbonization; ocular burns, burns at risk of secondary functional deficits; circumferential burns of the extremities, chest or neck. Wear face mask and sterile gloves during the examination.

Th.A-Chapter 10 27/01/10 14:46 Page 268

– Assess for associated injuries (fractures, etc.).
– Protect the patient and keep him warm: clean/sterile sheet, survival blanket.
– Insert a urinary catheter if burns involve > 15% of BSA, and in the case of electrical burns or burns of the perineum/genitalia.
– Insert a nasogastric tube if burns involve > 20% of BSA (in the operating room while carrying out dressing procedure).
– Calculate and initiate fluid and electrolyte requirements for the first 24 hours.
– Intensive monitoring: level of consciousness, pulse, blood pressure, pulse oxymetry, respiratory rate (RR) hourly; temperature and urine output every 4 hours.
– Additional testing: haemoglobin, blood group, urine dipstick test.
– Prepare the patient for the first dressing procedure in the operating room.

Notes:
– Burns do not bleed in the initial stage: check for haemorrhage if haemoglobin level is normal or low.
– Burns alone do not alter the level of consciousness. In the case if altered consciousness, consider head injury, intoxication, postictal state in epileptic patients.
– Clinical manifestations of electrical burns vary significantly according to the type of current. Look for complications (arrhythmia, rhabdomyolysis, neurological disorders).

II. General measures during the first 48 hours

Resuscitative measures

Intravenous replacement fluid to correct hypovolaemia:

Fluid and electrolyte requirements during the first 48 hours according to age

	Child < 12 years	**Child ≥ 12 years/adult**
0 - 8 h	2 ml/kg x % BSA of RL + maintenance fluid* per hour x 8 h	2 ml/kg x % BSA of RL
8 - 24 h	2 ml/kg x % BSA of RL + maintenance fluid* per hour x 16 h	2 ml/kg x % BSA of RL
24 - 48 h	Daily maintenance IV fluid requirements* minus oral fluids such as milk, broth, gavage feeds (do not include drinking water in the calculation).	40 ml/kg RL minus oral fluids (do not include drinking water in the calculation).

* maintenance fluid: alternate RL and 5% glucose: 4 ml/kg/h for first 10 kg of body weight + 2 ml/kg/h for next 10 kg + 1 ml/kg/h for each additional kg (over 20 kg, up to 30 kg)

Note: increase replacement volumes by 50% (3 ml/kg x % BSA for the first 8 hours) in the event of inhalation injury or electrical burn. For burns > 50% BSA, limit the calculation to 50% BSA.

This formula provides a guide only and should be adjusted according to systolic arterial pressure (SAP) and urine output. Avoid fluid overload. Reduce replacement fluid volumes if urine output exceeds the upper limit.

Th.A-Chapter 10 27/01/10 14:46 Page 269

Target endpoints for IV replacement fluids

	Non-electrical burns			Electrical burns
	Child < 1 year	Child 1-12 years	Child > 12 years/ adult	All ages
AP (mmHg)	SAP ≥ 60	SAP 70 to 90 + (2 x age)	SAP ≥ 100	Age appropriate SAP
Urine output	1 to 2 ml/kg/h	1 to 1.5 ml/kg/h	0.5 to 1 ml/kg/h	1 to 2 ml/kg/h

In patients with oliguria despite adequate fluid replacement:
dopamine IV: 5 to 15 µg/kg/min by IV pump
or **epinephrine** IV: 0.1 to 0.5 µg/kg/min by IV pump

Stop the infusion after 48 hours, if fluid requirements can be met by the oral route or gavage.

Respiratory care

In all cases: continuous inhalation of humidified oxygen, chest physiotherapy.
Emergency surgical intervention if necessary: tracheotomy, chest escharotomy.
Do not administer corticosteroids (no effect on oedema; predisposition to infection).
No specific treatment for direct bronchopulmonary lesions.

Analgesia

See *Pain management*, page 271.

Nutrition

Start feeding early, beginning at H8:
– Daily needs in adults:
  • calories : 25 kcal/kg + 40 kcal/% SCB
  • proteins : 1.5 to 2 g/kg
– High energy foods (NRG5, Plumpy'nut, F100 milk) are necessary if the BSA is > 20% (normal food is inadequate).
– Nutritional requirements are administered according to the following distribution: carbohydrates 50%, lipids 30%, proteins 20%.
– Provide 5-10 times the recommended daily intake of vitamins and trace elements.
– Enteral feeds are preferred: oral route or nasogastric tube (necessary if BSA > 20%).
– Start with small quantities on D1, then increase progressively to reach recommended energy requirements within 3 days.
– Assess nutritional status regularly (weigh twice weekly).
– Reduce energy loss: occlusive dressings, warm environment (28-33°C), early grafting; management of pain, insomnia and depression.

Patients at risk of rhabdomyolysis (deep and extensive burns, electrical burns, crush injuries to the extremities)

Monitor for myoglobinuria: dark urine and urine dipstick tests. If present, induce alkaline diuresis for 48 hours (20 ml of **8.4% sodium bicarbonate** per litre of RL) to obtain an output of 1 to 2 ml/kg/h. Do not administer dopamine or furosemide.

Th.A-Chapter 10 27/01/10 14:46 Page 270

Control of infection

Precautions against infection are of paramount importance until healing is complete. Infection is one of the most frequent and serious complications of burns:
– Follow hygiene precautions (e.g. sterile gloves when handling patients).
– Rigorous wound management (dressing changes, early excision).
– Separate "new" patients (< 7 days from burn) from convalescent patients (≥ 7 days from burn).
– Do not administer antibiotherapy in the absence of systemic infection. Infection is defined by the presence of at least 2 of 4 following signs: temperature > 38.5°C or < 36°C, tachycardia, tachypnoea, elevation of white blood cell count by more than 100% (or substantial decrease in the number of white blood cells).
– In the event of systemic infection, start empiric antibiotic treatment:
Children > 1 month:
cefazolin IV: 75 mg/kg/day in 3 injections + **ciprofloxacin** PO: 30 mg/kg/day in 2 doses
Adults:
cefazolin IV: 6 g/day in 3 injections + **ciprofloxacin** PO: 1.5 g/day in 3 doses
– Local infection, in the absence of signs of systemic infection, requires topical treatment with silver sulfadiazine.

Other treatments

– **Omeprazole** IV from D1:
Children: 1 mg/kg once daily
Adults: 40 mg once daily
– Tetanus immunization/prophylaxis (see *Tetanus*, page 170).
– Thromboprophylaxis: **nadroparin** SC beginning 48 to 72 h post-injury. High risk dosing protocol if the BSA is > 50% and/or in the event of high-voltage electrical injury; moderate risk dosing protocol if the BSA is 20 to 50% and/or in the event of burns of the lower limbs.
– Physiotherapy from D1 (prevention of contractures), analgesia is necessary.
– Intentional burns (suicide attempt, aggression): appropriate psychological follow-up.

III. Local treatment

Regular dressing changes[1] prevent infection, decrease heat and fluid losses, reduce energy loss, and promote patient comfort. Dressings should be occlusive, assist in relieving pain, permit mobilisation, and prevent contractures.

– Basic principles
  • Rigorous adherence to the principles of asepsis.
  • Dressing changes require morphine administration in the non-anaesthetised patient.
  • The first dressing procedure is performed in the operating room under general anaesthesia, the following in an operating room under general anaesthesia or at the bedside with morphine.

– Technique
  • At the time of the first dressing procedure, shave any hairy areas (armpit, groin, pubis) if burns involve the adjacent tissues; scalp (anteriorly in the case of facial burns, entirely in the case of cranial burns). Cut nails.
  • Clean the burn with **polyvidone iodine** scrub solution (1 volume of 7.5% PVI + 4 volumes of 0.9% sodium chloride or sterile water). Scrub gently with compresses, taking care to avoid bleeding.

[1] Open technique « naked burn patient under a mosquito net » and water immersion therapy are obsolete and should no longer be used.

Th.A-Chapter 10 27/01/10 14:46 Page 271

- Remove blisters with forceps and scissors.
- Rinse with 0.9% sodium chloride or sterile water.
- Dry the skin by blotting with sterile compresses.
- Apply **silver sulfadiazine** directly by hand (wear sterile gloves) in a uniform layer of 3-5 mm to all burned areas (except eyelids and lips).
- Apply a greasy dressing (Jelonet® or petrolatum gauze) using a to-and-fro motion (do not use circular dressings).
- Cover with a sterile compresses, unfolded into a single layer. Never encircle a limb with a single compress.
- Wrap with a crepe bandage, loosely applied.
- Elevate extremities to prevent oedema; immobilise in extension.

– Frequency: routinely every 48 hours; daily in the event of superinfection or in certain areas (e.g. perineum).

– Monitoring
  - Distal ischaemia of the burned limb is the main complication during the first 48 hours. Assess for signs of ischaemia: cyanosis or pallor of the extremity, dysaesthesia, hyperalgia, impaired capillary refill.
  - Monitor daily: pain, bleeding, progression of healing and infection.

IV. Surgical care

– Emergency surgical interventions:
  - Escharotomy: in the case of circumferential burns of arms, legs or fingers, in order to avoid ischaemia, and circumferential burns of chest or neck that compromise respiratory movements.
  - Tracheotomy: in the event of airway obstruction due to oedema (e.g. deep cervicofacial burns). Tracheotomy can be performed through a burned area.
  - Tarsorrhaphy: in the event of ocular or deep eyelid burns.
  - Surgery for associated injuries (fractures, visceral lesions, etc.).

– Burn surgery:
  - Excision-grafting of deep burns, in the operating room, under general anaesthesia, between D5 and D6: excision of necrotic tissue (eschar) with simultaneous grafting with autografts of thin skin. This intervention entails significant bleeding risk, do not involve more than 15% of BSA in the same surgery.
  - If early excision-grafting is not feasible, default to the process of sloughing-granulation-re-epithelisation. Sloughing occurs spontaneously due to the action of sulfadiazine/petrolatum gauze dressings and, if necessary, by mechanical surgical debridement of necrotic tissue. This is followed by granulation, which may require surgical reduction in the case of hypertrophy. The risk of infection is high and the process is prolonged (> 1 month).

V. Pain management

All burns require analgesic treatment. Pain intensity is not always predictable and regular assessment is paramount: use a simple verbal scale (SVS) in children > 5 years and adults and NFCS or FLACC scales in children < 5 years (see *Pain*, page 29).

Th.A-Chapter 10 27/01/10 14:46 Page 272

Morphine is the treatment of choice for moderate to severe pain. Development of tolerance is common in burn patients and requires dose augmentation.
Adjuvant treatment may complement analgesic medication (e.g. massage therapy, psychotherapy).

Continuous pain (experienced at rest)

– Moderate pain:
paracetamol PO: 60 mg/kg/day in 4 divided doses
+ **tramadol** PO: 4 to 8 mg/kg/day in 4 divided doses

– Moderate to severe pain:
paracetamol PO: 60 mg/kg/day in 4 divided doses
+ **slow release morphine** PO: 1 to 2 mg/kg/day in 2 divided doses at 12 hour-interval. In patients with severe burns, oral drugs are poorly absorbed in the digestive tract during the first 48 hours. Morphine must be administered by SC route: 0.2 mg/kg every 4 hours.

Acute pain experienced during care

Analgesics are given in addition to those given for continuous pain.
– Significant medical interventions and extensive burns: general anaesthesia in an operating room.
– Limited non-surgical interventions (dressings, painful physiotherapy):
  • Mild to moderate pain, 60 to 90 minutes before giving care:
  codeine PO: 0.6 mg/kg or **tramadol** PO: 2 mg/kg rarely allows treatment to be completed comfortably. In the event of treatment failure, use morphine.
  • Moderate or severe pain, 60 to 90 minutes before giving care:
  immediate release morphine PO: initial dose of 0.5 to 1 mg/kg. The effective dose is usually around 1 mg/kg, but there is no maximum dose.
  or **morphine** SC: initial dose of 0.2 to 0.5 mg/kg. The effective dose is usually around 0.5 mg/kg, but there is no maximum dose.

Note: doses given are for adults.
For paracetamol, dosing is the same in children.
For tramadol and codeine, dosing is the same in children > 6 months.
For morphine, dosing is the same in children > 1 year, should be halved in children less than 1 year, and quartered in infants less than 3 months.

– Pain management using morphine during dressing changes at the bedside requires:
  • A trained nursing team.
  • Availability of immediate release oral morphine and naloxone.
  • Close monitoring: level of consciousness, RR, pulse, SaO_2, every 15 min for the first hour following dressing change, then routine monitoring.
  • Assessment of pain intensity and sedation during the intervention and for 1 hour thereafter.
  • Necessary equipment for ventilation by mask and manual suction.
  • Gentle handling of the patient at all times.

– Adjustment of morphine doses for subsequent dressings:
  • If pain intensity (SVS) is 0 or 1: continue with the same dose.
  • If SVS score ≥ 2: increase the dose by 25 to 50%. If pain control remains inadequate, the dressing change should be carried out in the operating room under anaesthesia.

– Take advantage of the residual analgesia following dressing changes to carry out physiotherapy.

– As a last resort (morphine unavailable and no facilities to give general anaesthesia), in a safe setting (trained staff, resuscitation equipment, recovery room), adding **ketamine** IM at analgesic doses (0.5 to 1 mg/kg) reinforces the analgesic effect of the paracetamol + tramadol combination given before a dressing change.

Th.A-Chapter 10 27/01/10 14:46 Page 273

Chronic pain (during the rehabilitation period)

– The treatment is guided by self-evaluation of pain intensity, and utilises paracetamol and/or tramadol. Patients may develop neuropathic pain (see treatment page 35).

– All other associated pain (physiotherapy, mobilization) should be treated as acute pain.

Minor burns *(outpatient treatment)*

– Wound care: dressings with silver sulfadiazine or petrolatum gauze (except for first-degree superficial burns).

– Pain: paracetamol ± tramadol usually suffices.

Th.A-Chapter 10 27/01/10 14:46 Page 274

Abscesses

An abscess is a collection of pus in the soft tissues most commonly due to *Staphylococcus aureus*.

During the suppurative stage, a 'ripe' abscess is red, inflamed, painful, shiny and swollen. It is usually fluctuant on palpation and may be fistulated. At this stage, the abscess cavity is inaccessible to antibiotics and surgical drainage is the only effective treatment.

During the early indurated stage, that precedes the suppurative stage medical treatment may be effective.

Treatment

Medical treatment (indurated stage)

- Antibiotic therapy:
  Children: **amoxicillin** PO: 80 mg/kg/day in 2 or 3 divided doses
  + **metronidazole** PO: 30 to 50 mg/kg/day in 3 divided doses
  Adults: **amoxicillin** PO: 4 g/day in 2 or 3 divided doses
  + **metronidazole** PO: 1.5 g/day in 3 divided doses
  or
  amoxicilline+ **clavulanic acid** (**co-amoxiclav**) PO
  Children: 80 mg/kg/day in 3 divided doses
  Adults: 4 g/day in 3 divided doses
- Adapt analgesics to the pain level (see *Pain*, page 29).
- Apply compresses soaked in 70% alcohol, 2 times/day (maximum 3 times/day to prevent burns to the skin).

If there is improvement after 48 hours: continue antibiotic treatment for 5 days to complete 7 days of treatment.
If there is no improvement after 48 hours of correct treatment: treat surgically.

Surgical drainage (suppurative stage)

Material

– Sterile scalpel handle and blade
– Sterile curved, non-toothed artery forceps (Kelly type)
– Sterile gloves
– Antiseptic
– 5 or 10 ml syringe
– Non-absorbable sutures
– Sterile corrugated drain

Th.A-Chapter 10 27/01/10 14:46 Page 275

Anaesthesia

With the exception of paronychia, local anaesthesia of the abscess is usually impossible. General anaesthesia may be indicated, using:
ketamine IM: 10 mg/kg

Technique

– **Incision** (Figure 8a)
  - Hold the scalpel between the thumb and middle finger of the dominant hand, the index finger presses on the handle. Hold the abscess between the thumb and index finger of the other hand. The scalpel blade should be perpendicular to the skin.
  - The incision is made in a single stroke along the long axis of the abscess. The incision must be long enough for a finger to be inserted.
  - Be cautious when excising an abscess located over a blood vessel (carotid, axillary, humeral, femoral, popliteal).

– **Digital exploration** (Figure 8b)
  - Explore the cavity with the index finger, breaking down all loculi (a single cavity should remain), evacuate the pus and explore to the edges of the cavity.
  - The exploration also allows an assessment of the extent of the abscess, the depth, and location with respect to underlying structures (arterial pulsation) or any possible contact with underlying bone. In this last case, seek surgical advice.

– **Washing**

  Abundant washing of the cavity using a syringe filled with antiseptic solution.

– **Drainage** (Figure 8c)

  Insert a drain (or, failing that a gauze wick) into the base of the cavity. If possible, fix it to the edge of the incision with a single suture. The drain is withdrawn progressively and then, after 3 to 5 days removed completely.

Figure 8a
Incision with a scalpel

Th.A-Chapter 10 27/01/10 14:46 Page 276

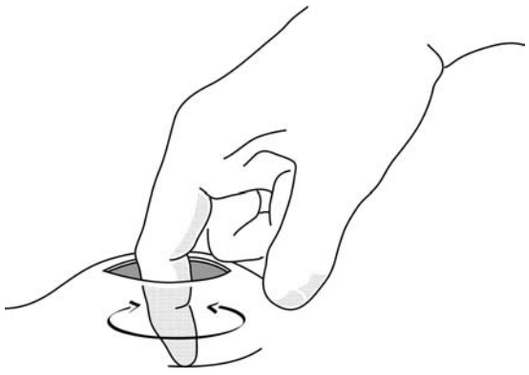


Figure 8b
Exploration of the cavity, breaking down any loculi

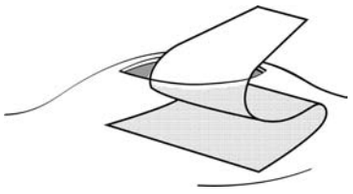


Figure 8c
Drain fixed to the skin

Figures 8: *Surgical drainage of an abscess*

Special sites

Breast abscesses

(Figures 9a to 9d)

– Breast abscesses are usually superficial, but deep ones, when they occur, are more difficult to diagnose and drain.

Medical treatment (indurated stage)

– Antibiotic treatment (see above)

– Apply a constrictive bandage, stop breast-feeding from the infected breast; express milk using a breast pump to avoid engorgement.

Th.A-Chapter 10 27/01/10 14:46 Page 277

Surgical drainage (suppurative stage)

– Incision:
  • radial for superficial abscesses,
  • peri-areolar for abscesses near the nipple,
  • submammary for deep abscesses.
– Gentle exploration with a finger.
– Wash abundantly with a syringe filled with an antiseptic solution.
– Insert a corrugated drain.

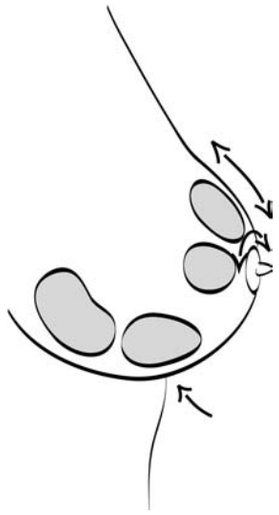


Figure 9a
Locations of breast abscesses

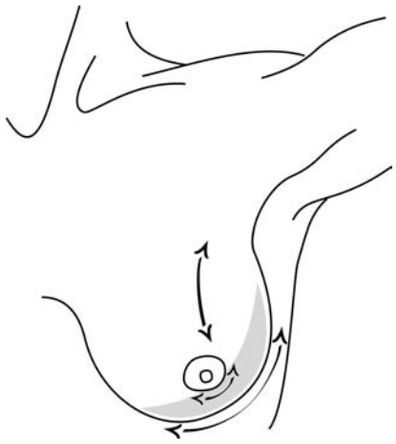


Figure 9b
Incisions: radial, peri-areolar, submammary

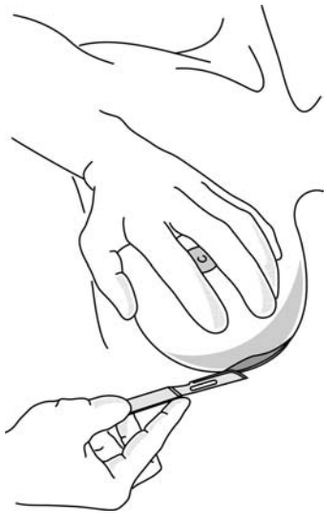


Figure 9c
Submammary incision

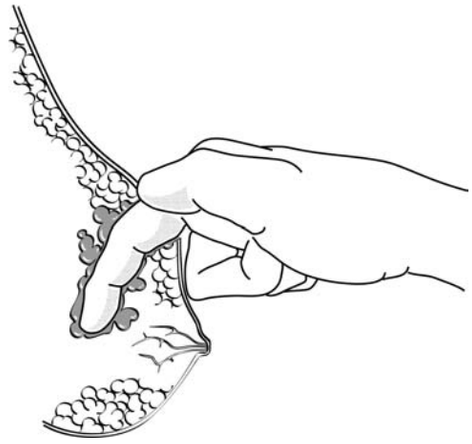


Figure 9d
Gentle exploration with a finger, breaking down any loculi

Th.A-Chapter 10 27/01/10 14:46 Page 278

Parotid abscess

There is a risk of severing the facial nerve when incising a parotid abscess. The incision should be horizontal along the lower margin of the abscess.

Figure 10
Incision of a parotid abscess

Th.A-Chapter 10 27/01/10 14:46 Page 279

Pyomyositis

– Pyomyositis is an infection of the muscle, almost always due to *Staphylococcus aureus*. It most commonly affects the muscles of the limbs and torso. These infections may occur simultaneously in multiple sites.
– During the early indurated stage, while the muscle is swollen, hot and painful, medical treatment may be effective. During the suppurative stage, when the abscess has formed, surgical drainage is the only effective treatment.

Treatment

Medical treatment (indurated stage)

– Immobilise the limb.
– Antibiotic therapy as for other abscesses (see page 274).
– Adapt analgesics to the pain level (see *Pain*, page 29).
– Apply compresses soaked in 70% alcohol, 2 times/day (maximum of 3 times/day to prevent burns to the skin).

Surgical drainage (suppurative stage)

Treatment of pyomyositis is by incision following the rules for incision of abscesses described on page 275. Muscle abscesses are often deeper than other abscesses. As a result, needle aspiration with a large bore needle may be necessary to locate the abscess; it yields thick pus. Needle aspiration is insufficient treatment even if pus is evacuated.

Material and anaesthesia

As for abscesses (see pages 274 and 275).

Technique

– Generous incision along the axis of the limb, over the site of the abscess and avoiding underlying neurovascular stuctures; incise the skin, subcutaneous tissues and muscular fascia with a scalpel (Figure 11a).
– Dissect the muscle fibres with non-toothed forceps (Kelly type) or round tipped scissors. Insert the instrument into the muscle until the purulent cavity is reached. During insertion, keep the instrument closed and perpendicular to the muscle fibres. Withdraw gently with the scissors or forceps slightly open, keeping instrument perpendicular to the fibres (Figure 11b).
– Use a forefinger to explore the cavity, break down any loculi and evacuate the pus (Figure 11c).
– Wash abundantly with antiseptic solution.
– Insert a large drain.
– Fix the drain to the edge of the wound using a single suture. Remove the drain on about the 5th day (Figure 11d).

Th.A-Chapter 10 27/01/10 14:46 Page 280

Special site

Myositis of the psoas muscle: if the abscess is on the right side, the clinical signs are the same as for appendicitis with pain in the right iliac area. Transfer the patient to a surgical centre.

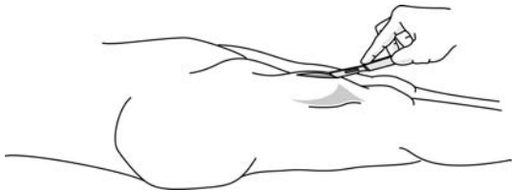


Figure 11a
Long incision

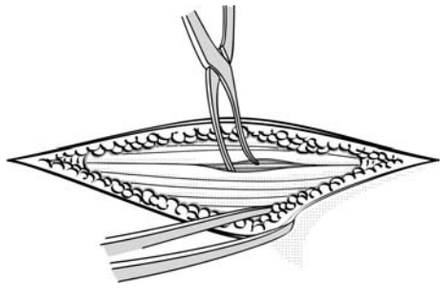


Figure 11b
Dissection of the muscle using Kelly forceps, insert closed then withdraw with the instrument slightly open

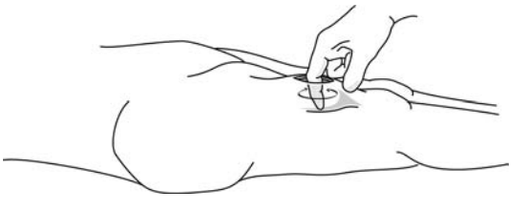


Figure 11c
Exploration and evacuation of pus with the finger

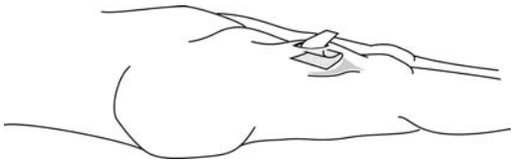


Figure 11d
Drain fixed to the skin

Figures 11: *Surgical drainage of a pyomyositis*

Th.A-Chapter 10 27/01/10 14:46 Page 281

Leg ulcers

– Leg ulcers are chronic losses of cutaneous tissue. They are common in tropical regions, resulting from varied aetiologies:
  • vascular: venous and/or arterial insufficiency
  • bacterial: leprosy, Buruli ulcer (*Mycobacterium ulcerans*), phagedenic ulcer, yaws, syphilis
  • parasitic: dracunculiasis (Guinea-worm disease), leishmaniasis
  • metabolic: diabetes
  • traumatic: trauma is often a precipitating factor combined with another underlying cause
– The history of the disease and a complete clinical examination (paying particular attention to the neurological examination to determine if there is a peripheral neuropathy caused by leprosy or diabetes) usually leads to an aetiological diagnosis.
– All ulcers may become complicated with either local or regional secondary infections (abscess, lymphadenopathy, adenitis, osteomyelitis, erysipela, pyodermitis), generalised infection (septicaemia), tetanus and after many years of evolution, skin cancer.

Daily local treatment

– Bathe the leg for 10 to 15 minutes in **NaDCC** or **chloramine** and rinse in boiled water.
– Remove any necrotic (black) and fibrinous (yellowish) tissue using compresses or excise the tissue with a scalpel.
– Apply:
  • to a clean ulcer, with little discharge: **10% polyvidone iodine** and vaseline
  • to a dirty ulcer, with little discharge: **silver sulfadiazine**
  • to an oozing ulcer: **10% polyvidone iodine** alone
  • multiple or extensive ulcers, particularly in children: **gentian violet** for oozing ulcers and **silver sulfadiazine** for ulcers with no discharge. Do not apply polyvidone iodine as there is a risk of transcutaneous iodine absorption.
– Cover with a dry sterile dressing.

Systemic treatment

– Treatment with analgesics in the event of pain: adapt the level and dosage to the individual (see *Pain*, page 29).
– Give systemic antibiotics in case of:
  • secondary infection (see *Bacterial skin infections*, page 105).

Th.A-Chapter 10 27/01/10 14:46 Page 282

- phagedenic ulcer (in the early stages, antibiotics may be useful. They are often ineffective in the chronic stages):

  benzylpenicillin procaine + benzylpenicillin IM (if necessary give half the dose in each buttock)
  Children: 100 000 IU/kg once daily for 7 days
  Adults: 4 MIU once daily for 7 days

  If the patient is allergic to penicillin:
  erythromycin PO
  Children: 50 mg/kg/day in 2 divided doses
  Adults: 2 g/day in 2 divided doses
  or
  doxycycline PO (except in children under 8 years and pregnant or lactating women)
  Children over 8 years: 4 mg/kg once daily
  Adults: 200 mg once daily
  or
  metronidazole PO
  Children: 30 mg/kg/day in 3 divided doses
  Adults: 1.5 g/day in 3 divided doses

  If after 7 days the choosen antibiotic shows to be effective, continue for as long as needed, treatment duration varies according to the clinical evolution.
  For patients treated with penicillin, change to oral treatment after 7 days by using **phenoxymethylpenicillin** PO
  Children from 1 to 5 years: 500 mg/day in 4 divided doses
  Children from 6 to 12 years: 1 g/day in 4 divided doses
  Adult: 2 g/day in 4 divided doses

– Treat the cause

– Complementary therapy:
  - Elevate the legs in cases of venous and/or lymphatic insufficiency
  - Give tetanus prophylaxis if appropriate (see *Tetanus*, page 170)
  - Skin graft[1] if the ulcer is extensive, clean, red and flat. Skin grafts are often necessary after surgical excision to heal phagedenic and Buruli ulcers.

[1] For techniques of skin grafting, refer to the MSF handbook, *Minor surgical procedures in remote areas*.

Th.A-Chapter 10 27/01/10 14:46 Page 283

Venomous bites and stings

Snake bites and envenomation

– More than 50% of the bites are dry bites, i.e. no envenomation occurred. In the event that venom is injected, the severity of envenomation depends on the species, the amount of venom injected, the location of the bite (bites on the head and neck are the most dangerous) and the weight, general condition and age of the individual (more serious in children).

– It is rare that the snake involved is identified. However, observation of the clinical signs may orient diagnosis and management. Two major syndromes are identified:
  • neurological disorders that evolve towards respiratory muscle paralysis and coma are common manifestations of elapid envenomation (cobra, mamba, etc.);
  • extensive local lesions (intense pain, inflammation with oedema and necrosis) and coagulation abnormalities are common manifestations of viperid or crotalid (rattle snake) envenomation.

  Clinical manifestations and management of bites and envenomations are described in the following page.

– Early diagnosis and monitoring of coagulation abnormalities is based on whole blood clotting tests performed in a dry tube (at the patient's arrival and then every 4 to 6 hours for the first day).
  Take 2 to 5 ml of whole blood, wait 30 minutes and examine the tube:
  • Complete clotting: no coagulation abnormality
  • Incomplete clotting or no clotting: coagulation abnormality, susceptibility to bleeding[1]

  In the event of coagulation abnormalities, continue to monitor once daily until coagulation returns to normal.

– Aetiological treatment is based on the administration of snake antivenom serum, only if there are clear *clinical manifestations of envenomation* or *coagulation abnormalities* are observed. Antivenom sera are effective, but rarely available (verify local availability) and difficult to store.
  Antivenom serum should be administered as early as possible: by IV infusion (in 0.9% sodium chloride) if using a poorly purified serum; by slow IV in the event of severe envenomation if the serum is known to be well purified. Repeat antivenom serum administration after 4 or 6 hours if the symptoms of envenomation persist.

  ⚠ For all patients, be prepared for an anaphylactic reaction, which, despite its potential severity (shock), is usually more easily controlled than coagulation disorders or serious neurological disorders.

– In asymptomatic patients (bites without signs of envenomation and with normal coagulation), monitoring must continue for at least 12 hours (24 hours preferred).

[1] There can be a considerable delay between the decrease in coagulation factors (less than 30 minutes after the bite) and the first signs of bleeding (other than bleeding at the site of the bite and/or the development of sero-sanguinous blisters), which may appear only 3 days after the bite. Conversely, bleeding may resolve prior to normalization of coagulation parameters.

Th.A-Chapter 10 27/01/10 14:46 Page 284

Clinical signs and treatment

Time since bite	Clinical manifestations	Possible aggressor	Treatment
Bite			
0	Fang marks Pain at the site of bite	?	Strict rest, immobilisation of the limb with a splint to slow the diffusion of venom[2]. Wound cleansing. Tetanus prophylaxis, page 170. Observe for manifestations of envenomation. A the dispensary level, prepare patient evacuation to a referral centre.
Envenomation			
10-30 minutes	Hypotension, myosis, excessive salivation and sweating, dysphagia, dyspnoea Local paraesthesia, paresis	Elapids	Insert a peripheral IV line. IV antivenom serum as soon as possible.
	Inflammatory syndrome: intense pain, extensive regional oedema	Viperids Crotalids	Insert a peripheral IV line. IV antivenom serum as soon as possible. Analgesics[3]. IV or PO[3] anti-inflammatories.
30 minutes-5 hours	Cobra syndrome: bilateral eyelid drooping, trismus, respiratory muscle paralysis Shock	Elapids	Intubation and assisted ventilation. See *Shock*, page 17.
30 minutes-48 hours	Haemorrhagic syndome: epistaxis, purpura, haemolysis or disseminated intra-vascular coagulation Shock	Viperids Crotalids	Monitor coagulation (blood clotting test in a dry tube). Transfusion of fresh blood in the event of severe anaemia. See *Shock*, page 17.
6 hours or more	No signs or changes in coagulation (non-venomous snakes or snake bite without envenomation)	?	Reassure the patient. Send him home after 12 hours.
	Tissue necrosis		Remove blisters, clean; daily (non occlusive) dressings. Surgical intervention for necrosis, depending on the extent, after the lesions stabilise (minimum 15 days).

– In case of clinical evidence of infection only: drainage of any abscess; amoxicillin/clavulanic acid (co-amoxiclav) for 7 to 10 days in case of cellulitis.
Infections are relatively rare, and most often associated with traditional treatment or with nosocomial transmission after unnecessary or premature surgery.

2 Tourniquets, incision-suction and cauterisation are ineffective and may be dangerous.

3 Do not use acetylsalicylic acid (aspirin).

Th.A-Chapter 10 27/01/10 14:46 Page 285

Scorpion stings and envenomation

– In most cases, the sting causes local effects including: pain, oedema, erythema. Management includes strict rest, wound cleansing, analgesics PO, and tetanus prophylaxis (see *Tetanus*, page 170). In patients with significant pain, infiltrate the area around the sting with local anaesthetic (**1% lidocaine**). Observe for 12 hours.

– General signs appear in the event of severe envenomation: hypertension, excessive salivation and sweating, hyperthermia, vomiting, diarrhoea, muscle pain, respiratory difficulties, seizures; rarely, shock.

– Aetiological treatment:
The use of scorpion antivenom sera is controversial (most of them are not very effective; they may be poorly tolerated due to insufficient purification).
In practice, in countries where scorpion envenomations are severe (North Africa, the Middle East, Central America and Amazonia), check local availability of antivenom sera and follow national recommendations.
The criteria for administration are the severity of the envenomation, the age of the patient (more severe in children) and the time elapsed since the sting. This should not exceed 2 to 3 hours. If the time elapsed is more than 2 or 3 hours, the benefit of antivenom serum is poor in comparison with the risk of anaphylaxis (in contrast to envenomation by snakes).

– Symptomatic treatment:
  • In the event of vomiting, diarrhoea or excessive sweating: prevention of dehydration (oral rehydration salts), especially in children.
  • In the event of muscle pain: **10% calcium gluconate** slow IV (children: 5 ml/injection, adults: 10 ml/injection, administered over 10 to 20 minutes).
  • In the event of seizures: diazepam may be used with caution; the risk of respiratory depression is increased in envenomated patients (see *Seizures*, page 23).

Spider bites and envenomation

– Treatment is usually limited to wound cleansing, strict rest, analgesics PO and tetanus prophylaxis (see *Tetanus*, page 170).

– Severe envenomations are rare. There are two main clinical syndromes:
  • Neurotoxic syndrome (black widow spider): severe muscle pain, tachycardia, hypertension, nausea, vomiting, headache, excessive sweating. The signs develop for 24 hours and then resolve spontaneously over a few days.
  • Necrotic syndrome (recluse spider): local tissue lesions, possible necrosis and ulceration; mild general signs (fever, chills, malaise and vomiting) which usually resolve over a few days. If present, haemolysis may sometimes be life threatening.

  As well as the general measures listed above, treatment includes administration of **10% calcium gluconate** by slow IV in the event of muscle spasms (children: 5 ml/injection, adults: 10 ml/injection, administered over 10 to 20 minutes).
  Incision and debridement of necrotic tissue are not recommended (not useful; may impair healing).

Hymenoptera stings (honeybees, wasps and hornets)

– Local care: remove the embedded sting (bee), clean with soap and water, and if very itchy, apply **calamine** lotion.

– Analgesics if necessary (paracetamol PO).

– In the event of an anaphylactic reaction:

epinephrine (**adrenaline**) IM
Use *undiluted* epinephrine solution (1:1000 = 1 mg/ml) and a 1 ml syringe graduated in 0.01 ml in children:

Child under 6 years:	0.15 ml
Child from 6 to 12 years:	0.3 ml
Child over 12 years and adult:	0.5 ml

For children, if 1 ml syringe is not available, use a *diluted* solution, i.e. add 1 mg epinephine to 9 ml of 0.9% sodium chloride to obtain a 0.1 mg/ml solution (1:10 000):

Child under 6 years:	1.5 ml
Child from 6 to 12 years:	3 ml

Repeat after 5 minutes if no clinical improvement.

Use IV epinephrine (for doses, see *Anaphylactic shock*, page 19) in patients with circulatory collapse or those who deteriorate despite receiving IM epinephrine.

Th.A-Chapter 10 27/01/10 14:46 Page 287

Dental infections

Infection arising as a secondary complication of an inflammation of the dental pulp. The severity and the treatment of dental infections depend on their evolution: localised to the infected tooth, extended to adjacent anatomical structures or diffuse infections.

Clinical features and treatment

Infection localised to a tooth and its surroundings (acute dental abscess)

– Intense and continuous pain.

– On examination: swelling limited to the gum surrounding the infected tooth. Purulent exudate may be present draining either through the root canal, or through the periodontal ligament (loosening the tooth) or through a gingival fistula. There are no signs of the infection extending to adjacent anatomical structures nor general signs of infection.

– Treatment:
  • Treatment is only surgical (the source of infection is inaccessible to antibiotics): root canal therapy (disinfection of the root canal) if possible or extraction of the tooth.[1]
  • Pain: **paracetamol** or **ibuprofen** PO (see *Pain*, page 29).

Infections extending to adjacent anatomical structures (acute dento-alveolar abscess)

Local spreading of an acute dental abscess into the surrounding bone and tissue.

– Painful gingival and buccal swelling with warm and tender skin, developing into a ripe abscess: intense pain, with trismus, particularly if the infection is in a posterior tooth, presence of general signs (fever, fatigue, cervical lymphadenopathy).

– In patients with acute gangrenous cellulitis (crepitations on palpation), treat as an infection extending into the cervico-facial tissues (following page).

– Treatment:
  • First surgical: incision and drainage of the pus or extraction of the tooth.[1]
  • Then antibiotic treatment for 5 days following the procedure: **amoxicillin** PO
    Children: 50 mg/kg/day in 2 divided doses
    Adults: 2 g/day in 2 divided doses
    Notes:
    If the dental procedure has to be delayed (local anaesthesia not possible due to inflammation, significant trismus), start with antibiotic treatment, but the dental procedure must be completed in the following days.
    If there is no improvement within 48 to 72 hours after the dental procedure, do not change antibiotic, but start a new procedure on the tooth.
  • Pain: **paracetamol** or **ibuprofen** PO (see *Pain*, page 29).

[1] For techniques of dental extraction, see the MSF handbook, *Minor surgical procedures in remote areas*.

Th.A-Chapter 10 27/01/10 14:46 Page 288

Infections extending into the cervico-facial tissues

– Extremely serious cellulitis, with rapidly spreading cervical or facial tissue necrosis and signs of septicaemia.

– Treatment:
  • treatment in an intensive care unit.
  • high dose antibiotic treatment (see *antibiotic treatment of septic shock*, page 20).
  • extraction of the tooth.[2]

[2] For techniques of dental extraction, see the MSF handbook, *Minor surgical procedures in remote areas*.

CHAPTER 11

Other conditions

Hypertension 291

Heart failure 294

Endemic goitre and iodine deficiency 297

Psychological disorders 298

Hypertension

– **Adult essential hypertension** is defined as a systolic pressure greater than or equal to 160 mmHg and/or a diastolic pressure greater than or equal to 90 mmHg.
The elevation must be constant: blood pressure must be measured twice at rest during three consecutive consultations over a period of three months.
Hypertension is a risk factor for stroke (cerebrovascular accident or CVA), heart failure, renal failure and atherosclerosis.

– **Hypertension in pregnancy** is defined as a systolic pressure greater than or equal to 140 mmHg or a diastolic pressure greater than or equal to 90 mmHg (with the patient seated and at rest). It may be isolated or associated with proteinuria or oedema in the case of pre-eclampsia.
Hypertension in pregnancy is a risk factor for eclampsia, placental abruption and premature delivery.

Treatment of adult essential hypertension

– In patients with medication-induced hypertension (oral contraceptives, hydrocortisone, MAO inhibitors, NSAID etc.), stop or change the treatment.
– Otherwise, start with diet and exercise modification: reduce salt intake, lose any excess weight, and increase the level of physical activity.
– If despite these measures the blood pressure remains consistently above 160/100 mmHg (or 140/80 mmHg for a diabetic patient or following a CVA), an anti-hypertensive medication may be added.
– Start with monotherapy. The optimal dose depends on the patient; reduce by half the initial dose for elderly patients.
– The three classes of anti-hypertensives used as initial therapy[1] are the thiazide diuretics (hydrochlorothiazide), the beta-blockers (atenolol), and the angiotensin converting enzyme (ACE) inhibitors (enalapril, captopril). For information:

Indications	Initial treatment
Uncomplicated hypertension	thiazide diuretic or beta-blocker
Patient over 65 years	thiazide diuretic
Diabetic patient	ACE inhibitor or beta-blocker
Complicated hypertension:	
Following a CVA	thiazide diuretic
Following a myocardial infarction	beta-blocker
Heart failure	ACE inhibitor
Renal failure	ACE inhibitor

– The treatment must be taken regularly. Abrupt cessation of beta-blocker treatment may cause adverse effects (malaise, angina)[2]. Only prescribe a treatment if it can be followed by a patient under regular surveillance.

1 The diuretics, beta-blockers, and ACE inhibitors have shown their capacity to prevent the complications of hypertension. They are preferred to other anti-hypertensives, notably calcium channel blockers (nifedipine).

2 Furthermore, a sudden stop to treatment with centrally acting anti-hypertensives (e.g. methyldopa, clonidine) may cause a rebound effect.

The objective is to reduce the blood pressure to below 160/90 mmHg (or 140/90 mmHg for diabetic patients) while producing the fewest possible adverse effects.
For uncomplicated hypertension:
- Start with a thiazide diuretic: **hydrochlorothiazide** PO 25 to 50 mg once daily.
- If the patient is not improving after 4 weeks, or if treatment is not tolerated: check compliance, and then if there are no contra-indications (asthma, uncontrolled heart failure), change to a beta-blocker: **atenolol** PO 50 to 100 mg once daily.
- If the treatment is still of little or no benefit: recheck compliance, and then consider combined therapy (thiazide diuretic + beta-blocker or thiazide diuretic + ACE inhibitor).

Note: if enalapril[3] is used as monotherapy (see table of indications), start with 5 mg once daily, then increase the dose every 1 to 2 weeks, according to blood pressure, up to 10 to 40 mg once daily or in 2 divided doses. In elderly patients, patients taking a diuretic or patients with renal impairment: start with 2.5 mg once daily as there is a risk of hypotension and/or acute renal impairment.

Specific case: treatment of hypertensive crisis

An occasional rise in blood pressure usually passes without problems, whereas aggressive treatment, notably with sublingual nifedipine, can have serious consequences (syncope, or myocardial, cerebral, or renal ischaemia).

– *In patients with hypertensive crisis*:
  - Reassure the patient and place him at rest.
  - If despite these measures the blood pressure remains elevated, the addition of **furosemide** PO (20 mg once daily) may, in certain cases, gradually reduce the blood pressure in 24 to 48 hours and prevent eventual complications.
– *In patients with hypertensive crisis complicated by acute pulmonary oedema*:
  - The objective is not to normalise the blood pressure at any price, but to treat the pulmonary oedema (see page 294).
  - Start or adjust the baseline treatment once the crisis is resolved.

Treatment of hypertension in pregnancy

During pregnancy, regularly monitor: blood pressure, weight, oedema, proteinuria, and fundal height.

– If the diastolic pressure is less than 110 mmHg: rest, monitoring, and a normal sodium and normal calorie diet.
– Start anti-hypertensive treatment when the diastolic pressure reaches 110 mmHg. Treatment is aimed only at preventing maternal complications of severe hypertension.
– During treatment, the diastolic pressure should always be maintained above 90 mmHg: lowering the pressure too aggressively carries the risk of foetal death from placental hypoperfusion.
– As the definitive treatment for hypertension is delivery, the mother must be transferred to a hospital for labour to be induced.
– Diuretics and angiotensin converting enzyme inhibitors (captopril, enalapril etc.) are contra-indicated in the treatment of hypertension in pregnancy.

[3] **Enalapril** (10 to 40 mg once daily or in 2 divided doses) may be replaced by **captopril** (100 mg/day in 2 divided doses).

– **In patients with isolated hypertension or mild pre-eclampsia**
  • Before 37 weeks of amenorrhoea: rest and observe as above.
  • After 37 weeks, if there is intrauterine growth retardation: delivery, vaginally or by caesarean section depending on the cervical assessment. If there is no growth retardation, induce delivery as soon as the cervix is favourable.
  • If the diastolic pressure is ≥ 110 mmHg: methyldopa PO or atenolol PO as below.

– **In patients with severe pre-eclampsia** (hypertension + massive proteinuria + significant oedema)
  • Urgent delivery within 24 hours, vaginally or by caesarean section depending on the cervical assessment.
  • Try to reduce the risk of eclampsia prior to delivery:
    magnesium sulphate by IV infusion: 4 g diluted in 0.9% sodium chloride over 15 to 20 minutes, then 1 g/hour for 24 hours following delivery or the last seizure.
    Monitor urine output. Stop the treatment if urinary output is less than 30 ml/hour or 100 ml/4 hours.
    ⚠ Before each injection, verify the concentration written on the ampoules: there is a risk of potentially fatal overdose. Always have calcium gluconate ready to reverse the effects of magnesium sulfate in the event of toxicity.
    Monitor patellar tendon reflexes every 15 minutes during the infusion. If the patient has malaise, drowsiness, difficulty speaking, or loss of patellar reflexes: stop the magnesium sulfate infusion and immediately give 1 g of **calcium gluconate** by slow, direct IV (over 5 to 10 minutes).
  • If the diastolic pressure is ≥ 110 mmHg:
    methyldopa PO: initially 500 to 750 mg/day in 2 to 3 divided doses for 2 days, then increase gradually if necessary by 250 mg every 2 to 3 days, until the optimal dose is reached, usually 1,5 g/day. Do not exceed 3 g/day.
    or **atenolol** PO: 50 to 100 mg once daily in the morning
    Do not stop treatment abruptly, reduce doses gradually.
    When oral treatment is not possible:
    hydralazine by slow IV infusion (ampoule of 20 mg/ml, 1 ml): 4 ampoules in 500 ml of 0.9% sodium chloride (do not use glucose solution). Increase the rate progressively to 30 drops/minute. Adjust the rate of the infusion depending on the blood pressure without allowing the diastolic pressure to drop below 90 mmHg.

– **In patients with eclampsia**
  • Urgent delivery within 12 hours, vaginally or by caesarean section depending on the cervical assessment and of the condition of the foetus.
  • Treatment of seizures: **magnesium sulfate** IV infusion (see *seizures during pregnancy*, page 25).
  • Nursing, hydration, monitor urinary output (insert an urinary catheter); oxygen (4 to 6 litres/minute).
  • Anti-hypertensive treatment only if the diastolic pressure is ≥ 110 mmHg as in pre-eclampsia (see above).
  • Postpartum: continue the magnesium sulfate for 24 hours following delivery or the last seizure, continue anti-hypertensive treatment if the diastolic pressure remains above 110 mmHg, monitor urinary output.

Heart failure

Heart failure is defined as the inability of the myocardium to provide normal haemodynamic function.
Left-sided heart failure (often secondary to coronary or valvular heart disease, and/or arterial hypertension) is the most common form.
There are two types:
– chronic heart failure with insidious onset
– acute heart failure, which is life threatening, presents either as acute pulmonary oedema or as cardiogenic shock.

Clinical features

– **Left-sided heart failure** secondary to left ventricular failure:
  • fatigue and/or progressive dyspnoea, occurs on exertion and then at rest (accentuated by the decubitus position, preventing the patient from lying down)
  • acute pulmonary oedema: acute dyspnoea, laryngeal crackles, cough, frothy sputum, anxiety, pallor, varied degrees of cyanosis, feeble rapid pulse, wet rales in both lung fields, muffled heart sounds, often with cardiac gallop
– **Right-sided heart failure** secondary to right ventricular failure:
  • oedema of the lower limbs, jugular venous distention, hepatomegaly, hepatojugular reflux
  • ascites in advanced stages
  Rarely isolated, this is often a consequence of left ventricular failure.
– **Global heart failure** secondary to failure of both ventricles:
  • left and right-sided signs. Signs of right ventricular failure are often the most prominent.

Treatment of acute heart failure (acute pulmonary oedema and cardiogenic shock)

– **First case: blood pressure is maintained**
  • Place the patient in the semi-reclined position with legs lowered.
  • Give high-flow oxygen
  • Reduce pulmonary pressure with combination furosemide + morphine + rapidly-acting nitrate derivatives:
  furosemide IV (onset of action in 5 minutes and peak effect in 30 minutes): 40 to 80 mg/injection, to be repeated every 2 hours according to clinical evolution. Monitor blood pressure and urine output.
  + **morphine**: according to severity 3 to 5 mg by slow IV injection or 5 to 10 mg by SC injection
  + **glyceryl trinitrate** sublingual: 0.25 to 0.5 mg. Monitor blood pressure. Repeat after 30 minutes if necessary, only if the systolic blood pressure remains above 100 mmHg.
  • In certain serious cases, if none of these drugs are available, bleed off 300 to 500 ml of blood over 5 to 10 minutes from the basilic vein (in the elbow fold) and monitor the blood pressure.

– **Second case: blood pressure collapsed**, see *cardiogenic shock*, page 21.

Treatment of chronic heart failure

The objective is to improve the prognosis and quality of life.

– Dietary modification: reduce salt intake to limit fluid retention, normal fluid intake (except in the case of anasarca: 750 ml/24 hours).

– **Treatment of fluid retention**

- Initial therapy: **furosemide** PO
  During congestive episodes: 40 to 120 mg once daily. When the congestive episode is controlled, reduce the dose to 20 mg once daily.
- The dose can be increased (up to 240 mg/day). If these doses are still ineffective, adding **hydrochlorothiazide** PO (25 to 50 mg/day for several days) may be considered.
- In case of treatment failure and in the absence of severe renal impairment, furosemide may be combined with **spironolactone** PO: 25 mg once daily.
- If present, drainage of pleural effusions by needle aspiration.

Note: the risks of administering diuretics include: dehydration, hypotension, hypo- or hyperkalaemia, hyponatremia, and renal impairment. Clinical monitoring (hydration, blood pressure) and if possible metabolic monitoring (serum electrolytes and creatinine), should be done regularly, especially if giving high doses or in elderly patients.

– **Baseline treatment**

- Angiotensin converting enzyme (ACE) inhibitors are the first line treatment. Start with low doses, especially in patients with low blood pressure, renal impairment, hyponatremia, or concurrent diuretic treatment.

  enalapril PO[1]: 5 mg once daily for the first week, then double the dose each week until the effective dose is reached, usually around 10 to 40 mg once daily or in 2 divided doses. Increases in the dose are made while monitoring the patient's blood pressure (the systolic pressure should remain above 90 mmHg) and blood chemistry (there is a risk of hyperkalemia[2] and renal impairment).

  In patients treated with diuretics, reduce the dose of the diuretic if possible while introducing ACE inhibitors.
  If the patient is taking high doses of diuretics, reduce the initial dose of enalapril to half (risk of symptomatic hypotension).
  Do not combine ACE inhibitors and spironolactone (risk of severe hyperkalemia).

- Digitalis glycosides are only indicated in patients with proven atrial fibrillation (ECG).
  If there are no contra-indications (bradycardia, unidentified rhythm disturbances):
  digoxine PO: 0.5 to 1 mg in 3 or 4 divided doses on the first day, then 0.25 mg once daily
  The therapeutic dose is close to the toxic dose. Do not exceed the indicated dose and give half the dose, or even a quarter (on alternate days) to elderly or malnourished patients and to patients with renal impairment.

1 Enalapril may be replaced by **captopril**: start with 6.25 mg three times daily for the first week, the effective dose is usually around 50 mg twice daily. The method of increasing the dose, the precautions, and patient monitoring are the same as for enalapril.

2 Moderate hyperkalaemia is frequent, but of no concern if it remains below 5.5 mEq/l.

- With global and left-sided heart failure, the nitrate derivatives may be used in case of signs of intolerance to ACE inhibitors (chronic cough, renal impairment, severe hypotension).
  isosorbide dinitrate PO: start with 10 to 15 mg/day in 2 or 3 divided doses and increase to the effective dose, usually around 15 to 60 mg/day. Very high doses (up to 240 mg/day) may be necessary.
- Whatever the treatment prescribed, monitoring should be regular: checking clinical improvement and treatment tolerance:
  - clinical monitoring consists of evaluating the weight, blood pressure, pulse (rhythm disturbances) and the progress of signs (dyspnoea, oedema, etc.);
  - laboratory monitoring is adapted according to the treatment.

Treatment of specific aetiologies

Hypertension (see page 291); *anaemia* (see page 37)

Cardiovascular or "wet" beriberi from vitamin B1 deficiency

thiamine IM or IV
Children: 25 to 50 mg/day for several days
Adults: 50 to 100 mg/day for several days
Then change to oral treatment with **thiamine** PO
Children and adults: 3 to 5 mg once daily for 4 to 6 weeks

Acute rheumatic fever

– Antibiotic treatment
  benzathine benzylpnicillin IM
  Children under 30 kg: 600 000 IU as a single dose
  Children over 30 kg and adults: 1.2 MIU as a single dose

– Anti-inflammatory treatment
  Start with **acetylsalicylic acid** PO: 50 to 100 mg/kg/day
  If the fever or cardiac signs persist, replace with a corticosteroid:
  prednisolone PO
  Children: 1 to 2 mg/kg/day
  Adults: 60 to 120 mg/day
  Continue this treatment for 2 to 3 weeks after normalisation of the erythrocyte sedimentation rate (ESR), then decrease the doses progressively (over 2 weeks).
  To avoid a relapse, resume the acetylsalicylic acid treatment in parallel with the decrease in prednisolone dose. The acetylsalicylic acid treatment is continued for 2 to 3 weeks after the corticosteroids are fully stopped.

– Secondary prophylaxis
  Prophylactic treatment lasts for several years (until 18 years old, even until 25 years in the case of cardiac effects; for life in the case of chronic valvular damage).
  benzathine benzylpenicillin IM
  Children under 30 kg: 600 000 IU as a single dose every 4 weeks
  Children over 30 kg and adults: 1.2 MIU as a single dose every 4 weeks

Endemic goitre and iodine deficiency

– Goitre is an enlargement of the thyroid gland. Endemic goitre occurs in iodine-deficient areas. Goitre can also be caused or aggravated by the regular consumption of goitrogens such as manioc, cabbage, turnips, millet etc.
– Goitre is an adaptive process: iodine is essential for the production of thyroid hormones; iodine deficiency impairs thyroid hormone synthesis; to compensate, the thyroid gland increases in volume. Thyroid function usually remains normal.
– As well as the development of goitre, iodine deficiency in pregnant women has serious consequences for the child (foetal and perinatal mortality, physical and mental retardation, cretinism). These risks must be prevented by providing iodine supplementation in iodine-deficient areas.

Clinical features

– The WHO proposes a simplified classification based on the significance of goitre:
Group 0: normal thyroid, no palpable or visible goitre
Group 1: enlarged thyroid, palpable but not visible when the neck is in the normal position
Group 2: thyroid clearly visible when the neck is in the normal position
– Possible mechanical complications (rare): compression, deviation of the trachea or of the oesophagus.

Prevention and treatment

The objective of prevention is to reduce the consequences of iodine deficiency in neonates and children. Supplying iodised salt through national programmes is the recommended method of prevention.
For prevention in populations living in iodine deficient areas where iodised salt is not available and for curative treatment of patients with goitre: use **iodised oil**, according to national protocols. For information (according to the WHO):

Population	Oral iodised oil as a single yearly dose (200 mg capsule)	IM iodised oil, every 2 years using a glass syringe (480 mg/ml ampoule)
Children under 1 year	1 capsule	240 mg (0.5 ml)
Children from 1 to 5 years	2 capsules	480 mg (1ml)
Children from 6 to 15 years	3 capsules	480 mg (1ml)
Pregnant women or women of childbearing age	2 capsules	480 mg (1ml)

Curative and preventive single-doses are the same. Oral treatment is preferred. Use injectable iodised oil for prevention only if annual administration of oral iodised oil is not possible. The target populations are pregnant and breastfeeding women, women of childbearing age and children.
In children, goitre disappears after several months. It disappears more slowly (or never) in adults despite restoration of normal thyroid function in 2 weeks. Surgery is only indicated for patients with local mechanical dysfunction.

Psychological disorders

The management of patients presenting with psychological symptoms starts with the exclusion of underlying organic causes: certain neurological disorders may present like psychosis; hyperthyroidism as anxiety, a hypoglycaemic patient may be agitated etc. Perform a clinical examination paying particular attention to a history of physical illness, even, and especially if, the patient is 'known' to have a history of mental illness.

Equally, patients may have physical symptoms which are rooted in mental illness: dyspnoea and heart palpitations may be signs of a *panic attack* (acute anxiety attack); anorexia and pain part of a *depressive syndrome*; delusions of organ dysfunction part of *psychotic disease*. It is the underlying mental disorder that must be considered and treated, after somatic causes have been excluded.

Also consider:
– Substance-related disorders: intoxication by alcohol, solvents, opiates, cannabis etc., or the withdrawal of these substances, may result in psychiatric-like symptoms (depression, anxiety, hallucinations, behaviour disorders etc.). Their use may be concurrent to a mental disorder, but generally it is only after the substance is stopped or a weaning period completed that a diagnosis can be made.
– Culturally shaped manifestations: a behaviour that looks pathological may in fact be banal in the given context. For example, if a recently deceased person appears and speaks to an individual during the mourning period, this may be a normal phenomenon and not a delusional disorder. It is therefore important to work with an 'informant' (in the anthropological meaning of the word) to deal with unfamiliar cultural contexts.

Place of and use of drug therapy

– Drug therapy is only one aspect of the treatment of psychiatric patients. Treatment must also include other therapeutic measures: listening, psychotherapy, and addressing of social factors.
– Use of certain psychotropic drugs may lead to dependence associated with tolerance, and severe withdrawal syndrome on cessation. The risk of creating iatrogenic addiction must be considered.
  • phenobarbital: although sometimes used as a sedative, has no indication in psychiatry and should be reserved for use in the treatment of epilepsy;
  • benzodiazepines (diazepam) should only be used when there are clear medical indications. Treatment with benzodiazepines should be limited to a maximum of 2 to 3 weeks.
– All psychotropic drugs must be prescribed by a physician.
  Psychotropic drugs are not indicated for children under 15 years of age.
  During pregnancy and breastfeeding, psychotropic drugs should only be prescribed in case of **absolute necessity and at the lowest effective dose**.
  Diazepam is strictly contra-indicated in patients with respiratory impairment and clomipramine is contra-indicated in patients with cardiac arrhythmia or with a recent history of myocardial infarction.

Clinical features and treatment

Anxiety

Patients with anxiety present with both psychological (unexplained fear, fear of dying or going crazy etc.) and physical symptoms (palpitations, difficulty in breathing, feeling of general malaise, hyperventilation). Anxiety may be acute, overwhelming the psychological functioning or persistant.

– *Anxiety may be isolated*:
  - If reassurance fails (one on one with the patient, listening in a understanding and reassuring manner) to resolve an acute anxiety attack or panic attack, treat with **diazepam**: 5 to 10 mg PO or 10 mg IM, to be repeated after 1 hour if necessary
  - Reactionary anxiety, if incapacitating, may sometimes justify a short-term treatment with **diazepam** PO: 5 to 15 mg/day in 2 or 3 divided doses for a few days

– *Always look for an underlying mental disorder*:
  - Anxiety is a constant feature of depression. In addition to antidepressant treatment, give **diazepam** PO: 5 to 15 mg/day in 2 or 3 divided doses for the first 2 weeks of treatment
  - Anxiety during psychosis is relieved with **chlorpromazine** PO: 25 to 150 mg in 2 or 3 divided doses or during a crisis, **chlorpromazine** IM: 25 to 50 mg
  - Anxiety is a characteristic feature of traumatic stress disorders that requires specific treatment (see below, *post-traumatic stress disorder*).

Depression

Symptoms of depression are common following a death or a significant loss (incarceration, population displacement etc.), initial treatment should not be with antidepressants. In these cases, start with supportive care and treatment with anxiolytics.

Depression is characterised by a set of symptoms that vary, but occur over a period of at least 2 weeks and include a change in the usual functioning of the individual. Symptoms include: sadness, thoughts of death, loss of interest and pleasure, fatigue, slowing or agitation, sleep disturbances, loss of appetite, feelings of worthlessness or guilt, poor concentration, anxiety.

Antidepressants should only be prescribed if the patient can continue treatment for at least 6 months and if regular follow-up is possible (support, monitoring of compliance and clinical evolution):
– either **clomipramine** PO: initial dose of 25 mg once daily, to be progressively increased (over several days) to 75 to 150 mg once daily
– or, if available, **fluoxetine** PO (which does not have the same adverse cardiac effects): 20 mg once daily

These dosages must be maintained for 6 months. Be aware that the adverse effects of clomipramine and fluoxetine appear in the first days of treatment while the therapeutic effects are not seen for 3 to 4 weeks. This must be clearly explained to the patient.

Suicide risk is increased from the 10th to 15th days of treatment. Diazepam may be added to the treatment, particularly in patients with severe depression, severe anxiety or incapacitating insomnia: **diazepam** PO: 5 to 15 mg/day in 2 or 3 divided doses, for a maximum of 2 weeks.

Post-traumatic stress disorder (PTSD)

At least 1/3 of individuals who have been exposed to traumatic events (witnesses or victims of physical assault or rape or of natural disasters) develop long term problems. These problems (unexplained somatic complaints, anxiety, depression, behaviour disorders) are often the cause of repeated consultations.

PTSD includes both psychological and physical symptoms that persist for more than 1 month after the traumatic event.

There are 3 principle groups of symptoms:

– *Intrusion*
The patient describes:
- intrusive images or thoughts linked to the traumatic event despite efforts to block them out,
- recurrent distressing dreams linked to the traumatic event,
- flashback episodes during which the patient feels as if he relives part of the traumatic event.

– *Avoidance*
The patient tries to avoid:
- everything that might be associated with the trauma (places, situations, people),
- having thoughts about the trauma: alcohol, psychotropic drugs or toxic drugs may be used for this purpose.

– *Increased arousal*
anxiety, insomnia, exaggerated startle response, panic attacks; sometimes hypertension, sweating, trembling, tachycardia, headache etc.

Other symptoms:

– *Behavioural*
Avoidance of social and family relationships, diminished interest and participation in usual activities, drug and alcohol use.

– *Affective*
Sadness, irritability, difficulty controlling emotions, outbursts of anger, feelings of being misunderstood, a sense of foreshortened future.

– *Physical*
- physical expression of anxiety: fatigue, gastrointestinal disturbances, pain;
- panic attacks: sudden onset of dyspnoea with tachycardia, palpitations, trembling, tightening of the chest, feeling that one is going to die or go crazy;
- conversion disorders: pseudoparalysis, pseudoseizures.

– *Cognitive*
Difficulty concentrating or with memory.

Symptoms may appear immediately or several months after the traumatic event. Once symptoms have persisted for more than 1 month, they rarely resolve spontaneously. A true depressive syndrome may appear secondarily. Psychological intervention should be a priority.

Psychological interventions

– It is important to make the patient understand that his symptoms are part of an understandable reaction to a very abnormal event.

– The patient has to be reminded that improvement will take time and that he will not forget the event, but that the memories will become less and less painful.

– The patient should be encouraged to describe his experience in a supportive and understanding setting (not only what happened, what he saw, heard or felt), but also his *emotions* and *thoughts*. The session should be managed with tact. Avoid:
  • giving an opinion or judging, expressing personal opinions;
  • reassurance or denying guilt ('it isn't your fault, at least you survived') as this only devalues what the patient expresses;
  • over active exploration of the patient's emotions (it is up to the patient to decide how far they want to go).

– If available, participation in group therapy may be beneficial. If these different measures do not help the patient, specialized individual treatment is recommended.

Behavioural treatment

It is important to assure the patient's physical and material security, to encourage abstinence from alcohol and toxic substances (which may aggravate symptoms), and to encourage the patient to participate in social activities and peer support and to help him imagine objectives for the future.

Treatment with phychotropic drugs

Benzodiazepines must be used very cautiously: they are not very effective and rapidly lead to dependence (see *place of and use of drug therapy*, page 298). They may be useful for a short period of time in patients with insomnia.

Clomipramine is effective against anxiety and increased arousal, and may reduce flashbacks. It is indicated if the symptoms persist despite the therapeutic measures described above or if depression complicates the clinical picture:
– either **clomipramine** PO: initial dose of 25 mg once daily, to be progressively increased (over several days) to 75 to 150 mg once daily
– or, if available, **fluoxetine** PO (which does not have the same adverse cardiac effects): 20 mg once daily

These dosages must be maintained for 6 months. Be aware that the adverse effects of clomipramine and fluoxetine appear in the first days of treatment while the therapeutic effects are not seen for 3 to 4 weeks. This must be clearly explained to the patient.

In some cases, specific interventions during the first days following the traumatic event may reduce the severity and duration of symptoms. If there are no mental health specialists in the field, the sections *psychological treatment and behavioural treatment* may prove useful.

Psychosis

An acute or chronic pathological state characterised by the presence of delusional thoughts: the patient is convinced of things that are beyond reality (e.g. hallucinations, ideas of persecution etc.). The delusions are sometimes associated with ego splitting (in schizophrenia or brief psychotic disorders): there is a loss of coherence between the affect, thoughts and behaviour and a lack of continuity in thoughts and speech.

Symptoms are improved with the use of **haloperidol** PO (3 to 10 mg/day) that must be prescribed for an extended period of time. If extra-pyramidal adverse effects occur, it may be helpful to add **biperiden** PO (2 mg 1 to 3 times/day). Treatment must include psychotherapy and social therapy and, whenever available, care by mental health specialists (particularly if there is a risk of confusion with culturally shaped manifestations (trance like states or possession may occur).

Agitation

Psychomotor agitation requires a diagnostic process which is rarely immediately possible.

- If possible, try to calm the patient down in a quiet place, with only 2 people present. Start by talking about physical symptoms: "you aren't feeling well, I am going to take your blood pressure" and then proceed with the examination. Try to identify if the person is oriented (confusion) and coherent (psychosis).
- Do not forget medical causes (e.g. neurological disorders) and toxic causes (intoxication, withdrawal).
- For patients with moderate agitation without respiratory difficulty:
  diazepam PO or IM: 10 mg to be repeated after 30 to 60 minutes if necessary.
- For patients with significant agitation and/or signs of psychosis (loss of contact with reality, delirium):
  chlorpromazine PO or IM: 25 to 50 mg to be repeated a maximum of 3 times in 24 hours

Insomnia

- *'Insomnia' linked to life conditions* (life on the streets, in institutions etc.): there is no specific treatment.
- *'Insomnia' linked to a physical problem*: do not give sedatives, treat the cause (e.g. give analgesics for pain).
- *'Insomnia' linked to drug therapy* (corticosteroids) or use of toxic substances (alcohol etc.): treatment is adapted on an individual basis.
- *'Insomnia' linked to a mental disorder* (depression, anxiety, post-traumatic stress disorder, delusional state): symptomatic treatment for no more than 2 weeks may be given (**diazepam** PO: 5 to 10 mg once daily at night). The underlying cause must be treated.
- *Isolated insomnia, usually linked to a particular event*: symptomatic treatment with **diazepam** PO: 5 to 10 mg once daily at night for no more than 2 weeks.

Annexes

The interagency emergency health kit
Annex 2 (WHO) 305

Practical advice for writing medical certificates
in the event of sexual violence 312

List of the drugs mentioned in this guide, including
the International Nonproprietary Names (INN) 315

Main references 318

Index 320

Annex 2: Assessment and treatment of diarrhoea[53]

A-2.1 Assessment of diarrhoeal patients for dehydration

Table 1: Assessment of diarrhoea patients for dehydration

	A	B	C
1. Look at: Condition[a] Eyes[b] Thirst	 Well, alert Normal Drinks normally, not thirsty	 Restless, irritable Sunken Thirsty, drinks eagerly	 Lethargic or unconscious Sunken Drinks poorly or not able to drink
2. Feel: Skin pinch[c]	Goes back quickly	Goes back slowly	Goes back very slowly
3. Decide:	The patient has **no signs of dehydration**	If the patient has two or more signs in B, there is **some dehydration**	If the patient has two or more signs in C, there is **severe dehydration**
4. Treat:	Use Treatment Plan A	Weigh the patient, if possible, and use Treatment Plan B	Weigh the patient and use Treatment Plan C **Urgently**

[a] Being lethargic and sleepy are *not* the same. A lethargic child is not simply asleep: the child's mental state is dull and the child cannot be fully awakened; the child may appear to be drifting into unconsciousness.
[b] In some infants and children the eyes normally appear somewhat sunken. It is helpful to ask the mother if the child's eyes are normal or more sunken than usual.
[c] The skin pinch is less useful in infants or children with marasmus or kwashiorkor or in obese children.

[53] Department of Child and Adolescent Health and Development. The treatment of diarrhoea - a manual for physicians and other senior health workers. Geneva: World Health Organization; 2005.

A-2.2 Treatment of acute diarrhoea (without blood)

Treatment Plan A: treat diarrhoea at home

Use this plan to teach the mother how to:

- prevent dehydration at home by giving the child more fluid than usual;
- prevent malnutrition by continuing to feed the child, and why these actions are important;
- recognize signs indicating that the child should be taken to a health worker.

The four rules of Treatment Plan A:

Rule 1:
Give the child more fluids than usual, to prevent dehydration

- Use recommended home fluids. These include: ORS solution, salted drinks (e.g. salted rice water or a salted yogurt drink), vegetable or chicken soup with salt.
- Avoid fluids that do not contain salt, such as: plain water, water in which a cereal has been cooked (e.g. unsalted rice water), unsalted soup, yoghurt drinks without salt, green coconut water, weak tea (unsweetened), unsweetened fresh fruit juice. Other fluids to avoid are those with stimulant, diuretic or purgative effects, for example: coffee, some medicinal teas or infusions.
- Be aware of fluids that are potentially dangerous and should be avoided during diarrhoea. Especially important are drinks sweetened with sugar, which can cause osmotic diarrhoea and hypernatraemia. Some examples are: commercial carbonated beverages, commercial fruit juices, sweetened tea.
- Use ORS solution for children as described in the box below. (Note: if the child is under 6 months and not yet taking solid food, give ORS solution or water.)

Give as much as the child or adult wants until diarrhoea stops. Use the amounts shown below for ORS as a guide. Describe and show the amount to be given after each stool is passed, using a local measure.

Age	Amount of ORS to be given after each loose stool	Amount of ORS to provide for use at home
≤ 24 months	50-100 ml	500 ml/day
2 - 10 years	100-200 ml	1L/day
≥10 years	as much as wanted	2L/day

Show the mother how to mix ORS and show her how to give ORS.

- Give a teaspoonful every 1-2 minutes for a child under 2 years.
- Give frequent sips from a cup for older children.

- If the child vomits, wait 10 minutes. Then give the solution more slowly (for example, a spoonful every 2-3 minutes).
- If diarrhoea continues after the ORS packets are used up, tell the mother to give other fluids as described in the first rule above or return for more ORS.

Rule 2:
Give supplemental zinc sulfate 20 mg tab to the child, every day for 10 to 14 days

Zinc sulfate can be given as dispersible tablets. By giving zinc sulfate as soon as diarrhoea starts, the duration and severity of the episode as well as the risk of dehydration will be reduced. By continuing zinc sulfate supplementation for 10 to 14 days, the zinc lost during diarrhoea is fully replaced and the risk of the child having new episodes of diarrhoea in the following 2 to 3 months is reduced.

Rule 3:
Continue to feed the child, to prevent malnutrition

- Breastfeeding should **always** be continued.
- The infant's usual diet should be continued during diarrhoea and increased afterwards;
- Food should **never** be withheld and the child's usual food should not be diluted;
- Most children with watery diarrhoea regain their appetite after dehydration is corrected;
- Milk:
  - **Infants of any age who are breastfed** should be allowed to breast-feed as often and as long as they want. Infants will often breastfeed more than usual, encourage this;
  - **Infants who are not breastfed**, should be given their usual milk feed (formula) at least every three hours, if possible by cup.
  - **Infants below 6 months of age who take breast milk and other foods** should receive increased breastfeeding. As the child recovers and the supply and the supply of breast milk increases, other foods should be decreased.
  - **A child who is at least 6 months old or is already taking soft foods** should be given cereals, vegetables and other foods, in addition to milk. If the child is **over 6 months and such foods are not yet being given**, they should be started during the diarrhoea episode or soon after it stops.
  - Recommended food should be culturally acceptable, readily available. Milk should be mixed with a cereal and if possible, 1 - 2 teaspoonfuls of vegetable oil should be added to each serving of cereal. If available, meat, fish or egg should be given.
  - Foods rich in potassium, such as bananas, green coconut water and fresh fruit juice are beneficial;
    - offer the child food every three or four hours (six times a day);
    - after the diarrhoea stops, continue to give the same energy-rich food, and give one more meal than usual each day for at least two weeks.

Rule 4:
Take the child to a health worker if there are signs of dehydration or other problems

The mother should take her child to a health worker if the child:

- Starts to pass many watery stools
- Vomits repeatedly
- Becomes very thirsty
- Is eating or drinking very poorly
- Develops a fever
- Has blood in the stool; or
- Does not get better in three days-

Treatment Plan B: oral rehydration therapy for children with some dehydration

Table 2:
Guidelines for treating children and adults with some dehydration

Approximate amount of ORS solution to give in the first 4 hours						
Age*	**<4 mths**	**4-11 mths**	**12-23mths**	**2-4 years**	**5-14 years**	**≥15 years**
Weight	< 5 kg	5-7.9 kg	8-10.9 kg	11-15.9 kg	16-29.9 kg	≥30 kg
Quantity	200-400 ml	400-600 ml	600-800 ml	800 ml-1.2 L	1.2-2 L	2.2-4 L
In local measure						

Use the patient's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the patient's weight in kg by 75.

- If the patient wants more ORS than shown, give more.
- Encourage the mother to continue breastfeeding her child.

NOTE: during the initial stages of therapy, while still dehydrated, adults can consume up to 750 ml per hour, if necessary, and children up to 20 ml per kg body weight per hour.

How to give ORS solution

- Teach a family member to prepare and give ORS solution.
- Use a clean spoon or cup to give ORS solution to infants and young children. Feeding bottles should **not** be used.
- Use droppers or syringes to put small amounts of ORS solution into mouths of babies.
- Children under 2 years of age, should get a teaspoonful every 1-2 minutes; older children (and adults) may take frequent sips directly from a cup.
- Check from time to time to see if there are problems.
- If the child vomits, wait 5-10 minutes and then start giving ORS again, but more slowly, for example, a spoonful every 2-3 minutes.

- If the child's eyelids become puffy, stop the ORS and give plain water or breast milk. Give ORS according to Plan A when the puffiness is gone.

Monitoring the progress of oral rehydration therapy

- Check the child frequently during rehydration.
- Ensure that ORS solution is being taken satisfactorily and the signs of dehydration are not worsening.
- After four hours, reassess the child fully following the guidelines in Table 1 and decide what treatment to give.
- If signs of **severe dehydration** have appeared, shift to Treatment Plan C.
- If signs indicating **some dehydration** are still present, repeat Treatment Plan B. At the same time offer food, milk and other fluids as described in Treatment Plan A, and continue to reassess the child frequently.
- If there are **no signs of dehydration**, the child should be considered fully rehydrated. When rehydration is complete:
    - skin pinch is normal;
    - thirst has subsided;
    - urine is passed;
    - child becomes quiet, is no longer irritable and often falls asleep.
- Teach the mother how to treat her child at home with ORS solution and food following Treatment Plan A. Give her enough ORS packets for 2 days.
- Also teach her the signs that mean she should bring her child back to see a health worker.

If oral rehydration therapy must be interrupted

If the mother and child must leave before the rehydration with ORS solution is completed:

- Show her how much ORS to give to finish the 4-hour treatment at home.
- Give her enough ORS packets to complete the four hour treatment and to continue oral rehydration for two more days, as shown in Treatment Plan B.
- Show her how to prepare ORS solution.
- Teach her the four rules in Treatment Plan A for treating her child at home.

When oral rehydration fails

- If signs of dehydration persist or reappear, **refer the child.**

Giving zinc sulfate

- Begin to give supplemental zinc sulfate tablets, as in Treatment Plan A, as soon as the child is able to eat following the initial four hour rehydration period.

Giving food

- Except for breast milk, food should not be given during the initial four-hour rehydration period.

- Children continued on Treatment Plan B longer than four hours should be given some food every 3-4 hours as described in Treatment Plan A.
- **All children** older than 6 months should be given some food before being sent home. This helps to emphasize to mothers the importance of continued feeding during diarrhoea.

Treatment Plan C: for patients with severe dehydration

Follow the arrows. If the answer is "yes" go across. If "no" go down.

Can you give intravenous (IV) fluids immediately?

Yes →

Start IV fluids immediately. If the patient can drink, give ORS by mouth while the drip is set up. Give 100 ml/kg Ringer's Lactate Solution (or if not available normal saline), divided as follows:

Age	First give 30 ml/kg in:	Then give 70 ml/kg in:
Infants (under 12 months)	1 hour*	5 hours
Older	30 minutes*	2 ½ hours

* Repeat once if radial pulse is still very weak or non-detectable.

- Reassess the patient every 1-2 hours. If hydration is not improving, give the IV drip more rapidly.
- Also give ORS (about 5 ml/kg/hour) as soon as the patient can drink: usually after 2-4 hours (infants) or 1-2 hours (older patients).
- After 6 hours (infants) or 3 hours (older patients), evaluate the patient using the assessment chart. Then choose the appropriate Plan (A, B or C) to continue treatment.

No ↓

Is IV treatment available nearby (within 30 minutes)?

Yes →

- Send the patient immediately for IV treatment.
- If the patient can drink, provide the mother with ORS solution and show her how to give it during the trip to receive IV treatment.

No ↓

Are you trained to use a naso-gastric tube (NG) for rehydration?

Yes →

- Start rehydration by tube with ORS solution: give 20 ml/kg/hour for 6 hours (total of 120 ml/kg).
- Reassess the patient every 1-2 hours:
  - if there is repeated vomiting or increased abdominal distension, give the fluid more slowly.
  - if hydration is not improved after 3 hours, send the patient for IV therapy.
- After 6 hours, reassess the patient and choose the appropriate treatment plan.

No ↓

Can the patient drink?

Yes →

- Start rehydration by mouth with ORS solution, giving 20 ml/kg/hour for 6 hours (total of 120 ml/kg).
- Reassess the patient every 1-2 hours:
  - if there is repeated vomiting, give the fluid more slowly - if hydration is not improved after 3 hours send the patient for IV therapy.
- After 6 hours, reassess the patient and choose the appropriate treatment plan.

No ↓

Urgent: send the patient for IV or NG treatment.

NB: If possible, observe the patient for at least six hours after rehydration to be sure the mother can maintain hydration giving ORS solution by mouth. If the patient is over two years old and there is cholera in your area, give an appropriate oral antibiotic after the patient is alert.

Writing medical certificates in the event of sexual violence

Physicians are often the first to be confronted with the consequences of violence. Victims are sometimes afraid to report to the authorities concerned, particularly when the population affected is vulnerable (refugees, prisoners, civilian victims of war etc.). In such a situation, the physician should try to determine if the event was isolated or part of larger scale violence (e.g. systematic rape).

Faced with sexual violence, the physician is obliged to complete a medical certificate for the benefit of the victim, irrespective of the country in which (s)he is practising.
The certificate is *individual* (for the benefit of the individual or their beneficiaries) and *confidential* (it falls within professional confidentiality). The examples of certificates presented in the following pages are written for *sexual violence*, but the approach is the same for *all forms of intentional violence*.

All medical certificates must include:
- The identity of the signing physician.
- The identity of the victim (except for certificates passed on to HCR or to ICRC *without the consent of the victim*, see below).
- The complete date and the time of the examination.
- The statement of the victim *in his/her own words*.
- The findings of the clinical examination.
- The samples taken and the examinations carried out.
- A conclusion (including, if possible, the length of Total Temporary Incapacity (TTI) and anticipated Partial Permanent Incapacity (PPI)).

Notes:
- The name of the victim (except for certificates passed on to HCR or to ICRC *without the consent of the victim*, see below), the name of the physician and his/her signature, as well as the date of the examination must appear on each page.
- A copy containing the victim's name is given *to the victim for future legal use*. Keep a copy of the medical certificate (or, if the case should arise, of the mandatory report[1]) in the patient record, archived to allow future authentication of the certificate given to the victim.

What the practitioner should not do:
- Rephrase the words of the victim as the practitioner's own.
- Endorse the identity of the aggressor nor the nature of the crime, this must be left to the legal authorities.
- Conclude that there was no sexual violence in the absence of lesions on clinical examination.

Examples of medical certificates for adults and children (see following pages).

With the consent of the victim, the physician gives a copy of the certificate containing the victim's name:
- to HCR (to the protection officer only) if the victim is a refugee or displaced, so that protection measures may be put in place for the individual;
- to ICRC if the victim is a victim of war or a prisoner.

Without the consent of the victim, the physician may give a copy of the certificate to HCR or ICRC, but without revealing the identity of the victim (concretely, the sections "family name, first name and precise address" should not appear).

[1] In principle, legal reporting of sexual violence against children under 15 years is mandatory. The only exception is if there is a risk that reporting may further harm the situation of the child. Consider each case individually.

Medical certificate for an adult

I, the undersigned, ... (family name, first name), **doctor of medicine**, **certify that I have examined on this the** ..... (hour, day, month, year), **at his/her request**, **Mr, Mrs, Miss** ..... (family name, first name), **born on the** ..... (day, month, year), **living at** .... (precise address).

(S)he declares that (s)he has been the victim of sexual violence on ..... (hour, day, month, year) **at** ..... (place), **by** ..... (aggressor known or unknown).

During the interview, (s)he stated:
" ..... "

Mr, Mrs, Miss ..... **presents the following clinical signs:**

– **On general examination:** .....
(describe the behaviour: prostrated, excited, calm, frightened, mute, tearful, etc.)

– **On somatic examination:** .....
(describe precisely all lesions observed on the entire body: signs of abrasion, cuts, scratches, bites, strangulation, swelling, burns etc. Indicate the site, the extent, the number, the character (old or recent), the severity etc.)

– **On genital examination:** .....
(is the hymen intact or not (if not, did it occur recently or in the past), traumatic lesions etc.)

– **On anal examination:** .....
(detectable traumatic lesions etc.)

– **Examinations completed** (particularly samples taken)**:** .....

– **Evaluate the risk of pregnancy:** .....

In conclusion, Mr, Mrs, Miss ..... **shows (or does not show) signs of recent violence and an emotional response (in)compatible with the violence of which (s)he reports to have been victim.**
(Remember: the absence of lesions does not allow a conclusion that there was no sexual violence).

Total Temporary Incapacity (TTI) should be granted for ..... **days without consideration of possible complications.**
Sequelae may persist leaving a Partial Permanent Incapacity (PPI) to be assessed by an expert at a future date.

This document is established with the consent of the patient and may be used for legal purpose.

Signature of physician

Medical certificate for a child

I, the undersigned, ... (family name, first name), **doctor of medicine, certify that I have examined on this the** ..... (hour, day, month, year), **at the request of** ..... (father, mother, legal representative), **the child** ..... (family name, first name), **born on the** ..... (day, month, year), **living at** .... (precise address of the parents or residence of the child).

During the interview, the child told me:
" ..... "
(quote as faithfully as possible the words of the child without interpreting them)

During the interview, ... (name of the person accompanying the child) **stated:**
" ..... "

This child presents the following clinical signs:

– **On general examination:** .....
((describe the behaviour: prostrated, excited, calm, frightened, mute, tearful, etc.)

– **On somatic examination:** .....
(describe precisely all lesions observed on the entire body: signs of abrasion, cuts, scratches, bites, strangulation, swelling, burns etc. Indicate the site, the extent, the number, the character (old or recent), the severity etc.)

– **On genital examination:** .....
(is the hymen intact or not (if not, did it occur recently or in the past), traumatic lesions, genital infection etc.)

– **On anal examination:** .....
(detectable traumatic lesions etc.)

– **Examinations completed** (particularly samples taken)**:** .....

– **Evaluate the risk of pregnancy:** .....

In conclusion, this child shows (or does not show) signs of recent violence and an emotional response (in)compatible with the violence of which (s)he reports to have been victim.
(Remember: the absence of lesions does not allow a conclusion that there was no sexual violence).

Total Temporary Incapacity (TTI) should be granted for ..... **days without consideration of possible complications.**
Sequelae may persist leaving a Partial Permanent Incapacity (PPI) to be assessed by an expert at a future date.

This document is established with the consent of ..... (father, mother or legal representative) **and may be used for legal purpose.**

Signature of physician

List of the drugs mentioned in this guide, including the International Nonproprietary Names (INN)

as well as the most common synonyms and proprietary names

Abacavir = ABC: Abac®, Abamune®, Ziagen®

Aciclovir: Viratup®, Zovirax®

Acetylsalicylic acid = ASA = Aspirin

Albendazole : Eskazole®, Zentel®

Aluminium hydroxide: Maalox®

Amitriptyline: Elavil®, Laroxyl®, Triptyzol®

Amodiaquine: Camoquine®, Flavoquine®

Amoxicillin: Amoxil, Clamoxyl®

Amoxicillin/clavulanic acid = co-amoxiclav: Augmentin®

Amphotericin B: Fungizone®

Amphotericin B liposomal: AmBisome®

Ampicillin: Pentrexyl®

Artemether: Paluther®

Artemether/lumefantrine = co-artemether: Coartem®, Riamet®

Artesunate: Arsumax®, Plasmotrim®

Artesunate/amodiaquine: Coarsucam®

Ascorbic acid = vitamin C: Laroscorbine®, Vitascorbol®

Atenolol: Tenormin®

Azithromycin: Zithromax®

Beclometasone: Beclazone®, Becotide®

Benzathine benzylpenicillin: Extencilline®, Penadur®, Penidural®

Benzylpenicillin = penicillin G: Crystapen®, Penilevel®

Benzylpenicillin procaine = penicillin G procaine: Depocillin®, Duracillin®

Benzylpenicillin procaine + benzylpenicillin = Fortified penicillin procaine: Bicillin®

Benznidazole: Radanil®

Benzyl benzoate: Ascabiol®

Biperiden: Akineton®

Bisacodyl: Dulcolax®

Bithionol: Bitin®

Calcium gluconate

Captopril: Capoten®, Lopril®

Carbamazepine: Tegretal®, Tegretol®

Cefazolin: Cefacidal®, Kefzol®

Cefixime: Suprax®

Cefotaxime : Claforan®

Ceftriaxone: Rocephin®

Chloramphenicol: Chloromycetin®, Kemicetine®

Chloramphenicol (long-acting oily)

Chloroquine: Nivaquine®

Chlorphenamine = chlorpheniramine: Teldrin®, Trimeton®

Chlorpromazine: Largactil®, Megaphen®, Thorazine®

Cimetidine: Tagamet®

Ciprofloxacin: Ciflox®

Clindamycin: Dalacin®

Clofazimine: Lamprene®

Clomipramine: Anafranil®

Cloxacillin: Cloxapen®, Orbenin®

Co-amoxiclav = amoxicilline/acide clavulanique: Augmentin®

Co-artemether = artéméther/lumefantrine: Coartem®, Riamet®

Codeine

Co-trimoxazole = sulfamethoxazole + trimethoprim: Bactrim®

Dapsone: Avlosulfon®, Disulone®

Dexamethasone

Diazepam: Valium®

Diclofenac: Cataflam®, Voltaren®

Didanosine = ddI = Videx®

Diethylcarbamazine: Banacide®, Hetrazan®, Notezine®

Digoxin: Coragoxine®, Lanoxin®

Diphtheria-Tetanus-Pertussis vaccine

Dopamine: Dynatra®, Intropin®

Doxycycline: Vibramycin®

Efavirenz: Stocrin®, Sustiva®

Eflornithine: Ornidyl®

Enalapril: Renitec®

Epinephrine = adrenaline

Ergocalciferol = vitamin D2

Erythromycin: Erythrocin®, Pantomicina®, Propiocine®

Ethambutol: Dexambutol®, Myambutol®

Ferrous salts (sulphate or fumarate)

Fluconazole: Triflucan®

Fluoxetine: Fluctine®, Prozac®

Folic acid = vitamin B9

Folinic acid: Refolinon®

Furosemide = frusemide: Lasilix®, Lasix®, Seguril®

Gelatin (fluid, modified): Gelofusine®, Plasmion®

Gentamicin: Genticin®

Gentian violet = crystal violet = GV

Glucose 10% = dextrose 10%

Glucose 50% = dextrose 50%

Glyceryl trinitrate = nitroglycerin = trinitrin

Griseofulvin: Fulcine®, Grisefuline®, Grisovin®

Haloperidol: Haldol®, Serenace®

Hepatitis B vaccine

Hydralazine: Apresoline®

Hydrochlorothiazide: Esidrex®, HydroSaluric®

Hydrocortisone: Efcortesol®, Cortagen®, Solucortef®

Hyoscine butylbromide = butylscopolamine: Buscopan®

Ibuprofen: Advil®, Brufen®, Nureflex®

Indinavir: Crixivan®

Iodine (iodised oil): Lipiodol®

Isoniazid = INH: Cemidon®, Rimifon®

Itraconazole: Sporanox®

Ivermectin: Mectizan®, Stromectol®

Japonese Encephalitis vaccine: JE-Vax®

Ketamine: Ketalar®, Ketanest®

Ketoconazole cream: Nizoral®

Lactulose: Duphalac®

Lamivudine = 3TC: Epivir®, Lamivir®

Levonorgestrel: Norlevo®, Plan B®, Vikela®

Lidocaine = Lignocaine: Xylocaine®

Loperamide: Imodium®, Imosec®

Magnesium sulphate

Malathion: Prioderm®

Measles vaccine:

Mebendazole: Pantelmin®, Vermox®, Wormin®

Mefloquine: Lariam®

Meglumine antimoniate: Glucantime®

Melarsoprol: Arsobal®

Meningococcal A+C vaccine

Meningococcal A+C+W135 vaccine

Metoclopramide: Primperan®

Metronidazole: Flagyl®

Miconazole muco-adhesive: Tibozole®

Minocycline: Minocin®

Misoprostol

Modified fluid gelatin: Gelofusine®, Plasmion®

Morphine

Morphine (immediate-release): Sevredol®

Morphine (sustained-release): Kapanol®

Naloxone: Nalone®, Narcan®

Nelfinavir: Viracept®

Nevirapine: Neravir®, Nevimune®, Viramune®

Niclosamide: Tredemine®, Yomesan®

Nicotinamide = vitamin PP = vitamin B3: Nicobion®

Nifedipine: Adalat®

Nifurtimox: Lampit®

Nitrofurantoine: Furadantin®

Nystatine: Mycostatine®, Nystan®

Omeprazole: Mopral®

Oral rehydration salts = ORS

Oxytocin: Syntocinon®

Paracetamol = acetaminophen: Doliprane®, Panadol®

Paromomycin = aminosidin: Humatin®, Gabbroral®

Pentamidine: Pentacarinat®, Pentam®

Permethrin 1% = Lyclear®

Permethrin 5%: Lyclear® dermal cream

Phenobarbital: Gardenal®, Luminal®

Phenoxymethylpenicillin = penicillin V: Oracillin®, Ospen®

Phenytoin: Di-hydran®, Dilantin®, Epanutin®

Phytomenadione = vitamin K1

Podophyllotoxin: Condyline®, Condylox®, Wartec®

Poliomyelitis vaccine (oral)

Polygeline: Haemaccel®

Polyvidone iodine = povidone iodine: Betadine®

Potassium chloride: Kaleorid®

Praziquantel: Biltricide®, Cysticide®

Prednisone and prednisolone: Cortancyl®, Solupred®

Promethazine: Phenergan®

Pyrazinamide: Zinamide®

Pyridoxine = vitamin B6: Hexobion®, Pyroxin®

Pyrimethamine: Daraprim®, Malocide®

Quinine

Rabies immunoglobulin

Rabies vaccine:

ReSoMal = ORS formula for severly malnourished children

Retinol = vitamin A

Ribavirine: Rebetol®, Virazole®

Rifampicin: Rifadin®

Ringer lactate = Hartmann's solution

Ritonavir: Norvir®

Salbutamol = albuterol: Salbulin®, Ventolin®

Saquinavir: Invirase®, Fortovase®

Silver sulfadiazine: Flamazine®

Sodium stibogluconate: Pentostam®

Sodium valproate: = valproic acid: Convulex®, Depakine®, Epilim®

Spectinomycin: Stanilo®, Trobicin®

Spironolactone: Aldactone®, Spiroctan®

Stavudine = d4T: Stavir®, Zerit®, Zeritavir®

Streptomycin

Sulfadiazine: Adiazine®

Sulfadoxine/pyrimethamine: Fansidar®

Suramin: Germanin®

Tenofovir = TDF: Viread®

Tetanus immunoglobulin

Tetanus vaccine

Tetracycline eye ointment

Thiamine = vitamin B1: Benerva®, Betaxin®

Tinidazole = Fasigyn®

Tramadol: Tramal®, Zamadol®, Zydol®

Triclabendazole: Egaten®, Fasinex®

Valproic acid = sodium valproate: Convulex®, Depakine®, Epilim®

Vitamin A = retinol

Whitfield ointment or benzoic acid 6% + salicylic acid 3% ointment

Yellow Fever vaccine

Zidovudine: Retrovir®

Zinc sulfate

Main references

WHO Publications

WHO. *Symptom relief in terminal illness*, Geneva, 1998.

WHO. *Management of severe malnutrition. A manual for physicians and other senior health workers*, Geneva, 2000.

WHO. *The management of nutrition in major emergencies*, Geneva, 2000.

WHO. *The clinical use of blood handbook*, Geneva, 2001.

WHO. *Management of severe malaria. A practical handbook*, Geneva, 2000.

WHO. *Guidelines for the treatment of malaria*, Geneva, 2006.

WHO in collaboration with MSF. *Human African Trypanosomiasis*. *A guide for drug supply*, Geneva, 2002.

WHO. *WHO Expert Committee on Rabies. Technical report series*, 8th report, Geneva, 1992.

WHO. *Plague manual*, Geneva, 1999.

WHO/INAIDS. *Safe and effective use of antiretroviral treatments in adults with particular reference to resource limited settings*, Geneva, 2000.

WHO. *Dengue haemorrhagic fever. Diagnosis, treatment, prevention and control*, Geneva, 1997.

WHO. *Guidelines for the management of sexually transmitted infections*, Geneva, 2003.

WHO. *Managing complications in pregnancy and childbirth. A guide for midwives and doctors*, Geneva, 2003.

WHO. *Hospital care for children. Guidelines for the management of common illnesses with limited resources*, 2005.

WHO. *WHO Model Formulary*, Geneva, 2006.

Other publications

American Public Health Association. *Control of communicable diseases manual*, 2004.

British Medical Association and Pharmaceutical Society of Great Britain. *British National Formulary*, n° 52, 2006.

Harrison's Principles of Internal Medicine, 16th ed., McGraw-Hill Education, 2004.

Manson's tropical diseases, 21st ed., Gordon C Cook editor, 2002.

Oxford Medical Publications. *Oxford handbook of tropical medicine*, Oxford University Press, 2005.

The Sanford. *Guide to HIV/AIDS therapy*, 2005.

Transactions of Royal Society of Tropical Medicine and Hygiene. *Leishmaniasis in Sudan*, vol 95, 2001.

Index

A

Abnormal vaginal discharge....233
Abortion....247
Abortion, threatened....247
Abruptio placenta....249
Abscess, acute dental....287
Abscess, acute dento-alveolar....287
Abscess, amoebic liver....88
Abscess, breast....276
Abscess, parotid....278
Abscess, peritonsillar....54
Abscesses....274
Acute flaccid paralysis....193
Agitation....302
AIDS....207
Amoebiasis....83,88
Anaemia....37
Ancylostomiasis....154
Angiomatosis, bacillary....219
Anthrax, cutaneous....109
Anxiety....299
Ascariasis....154
Asthma attack....73
Asthma, acute....73
Asthma, chronic....75

B

Bejel....112
Beriberi....296
Bites, venomous....283
Borreliosis....182
Bronchiolitis....64
Bronchitis, acute....62
Bronchitis, chronic....63
Brucellosis....176
Burns....266

C

Campylobacter....213
Candidiasis, intestinal....92,214
Candidiasis, vaginal....233,244
Carbuncle....106
Cataract....128
Certificates, medical (sexual violence)....312
Cervicitis....233
Cestodes....152
Chagas' disease....142
Chancroid....236,245
Chlamydia....231,233,244
Cholera....84
Clinical examination....10
Conjunctivitis....123
Conjunctivitis, neonatal....124
Cryptococcosis....215,217
Cryptosporidiosis....147,213
Cyclosporiasis....147
Cysticercosis....153
Cystitis, acute....224

D

Dehydration, WHO protocol....305
Dengue fever....201
Dental abscess, acute....287
Dental infections....287
Dento-alveolar abscess, acute....287
Depression....299
Dermatitis, diaper....103
Dermatitis, seborrhoeic....219
Dermatology, examination....97
Dermatophytoses....103
Diarrhoea, acute....83
Diarrhoea, parasitic....147
Diphtheria....55
Diphyllobothriasis....152
Donovanosis....236
Dressings....253
Duodenum disorders....89
Dysentery....86,88,213
Dyspepsia....91

E

Eclampsia....25,293
Ectopic pregnancy....247
Eczema....117
Endometritis....240
Enterobiasis....155
Envenomation....283
Epiglottitis, acute....51
Epilepsy....24
Erysipela....107

F

Fasciitis, necrotising....108
Fever....26,218
Fever, relapsing....182
Fever, yellow....204
Fevers, haemorrhagic viral....204
Filariasis....157
Filariasis, lymphatic....161
Flukes....149
Folic acid deficiency....38
Fungal infections, superficial....103

Furuncle 106

G

Gastrointestinal bleeding 90
Gastro-oesophageal reflux disease....89
Genital infections....229,244
Genital ulcers 236
Giardiasis 83,147
Goitre, endemic....297
Gonorrhoea....231,233,244

H

Haemolytic anaemia 38
Haemorrhagic disease of the newborn, phytomenadione prophylaxis 177
Haemorrhagic fevers, viral....204
Hansen's disease 113
Headache and HIV 217
Heart failure, adult 294
Hepatitis, viral....198
Herpes simplex 116
Herpes zoster....116
Herpes, genital 236,245
Herpes, oral 92,214
Hidradenitis, axillary 219
Histoplasmosis....215
History taking 10
HIV infection....207
Hookworm infection....154
Hydatid cyst 153
Hymenolepiasis 152
Hypertension....291
Hypoglycaemia 24

I

Impetigo 105
Infections extending into the cervico-facial tissues 288
Infections, genital 229,244
Infections, upper genital tract....240
Insomnia 302
Iodine deficiency....297
Iron deficiency....38
Isosporiasis 147,213

K

Kala-azar 144
Keratoconjunctivitis, viral epidemic....125
Kwashiorkor....40

L

Laboratory, examinations 11
Labour, premature....249
Laryngitis acute 51
Leg ulcers....281
Leishmaniases 144
Leprosy 113
Leptospirosis 180
Leukoplakia, oral....214
Lice....101
Loiasis....128,159
Louse-borne relapsing fever 182
Lower abdominal pain in women....239
Lumbar puncture....166
Lymphadenopathy, persistent generalised ...216
Lymphogranuloma venereum....236

M

Malaria 131
Malnutrition 40
Marasmus 40
Measles....189
Meningitis, bacterial....165
Meningitis, parasitic....217
Metrorrhagia 246
Microsporidium....213
Myositis of the psoas....280

N

Necrotising infections of the skin....108
Nematode infections 154
Neurosyphilis....217

O

Oedema, acute pulmonary....294
Onchocerciasis....128,157
Opistorchiasis....149
Otitis externa, acute....57
Otitis media, acute....57
Otitis media, chronic suppurative....59

P

Pain evaluation scales 30
Pain 29
Pain, lower abdominal (in women) 239
Papilloma viruses 243,245
Paragonimiasis....149
Paralysis, acute flaccid 193
Pediculosis 101
Pellagra....118
Penicilliosis 215
Peptic ulcer diseases....89
Perforation, gastric 90
Persistent generalised lymphadenopathy 216
Pertussis 60
Pharyngitis, acute 53
Pinta 112
Placenta praevia....248
Plague....178
Pneumocystosis 215
Pneumonia, acute 66
Poliomyelitis....192
Post-partum haemorrhage 250
Post-traumatic stress disorder 300

Pre-eclampsia 293
Premature labour 249
Prostatitis, acute 228
Protozoan infections, intestinal 147
Psoas, myositis 280
Psoriasis and HIV 219
Psychological disorders 298
Psychosis 302
Pterygium 128
Pulmonary oedema, acute 294
Pulmonary tuberculosis 78
Pyelonephritis, acute 226
Pyodermitis 105
Pyomyositis 279

R

Rabies 194
Relapsing fever 182
Relapsing fever, louse-borne 182
Relapsing fever, tick-borne 183
Rheumatic fever, acute 296
Rhinitis 49
Rhinopharyngitis 49
Rickettsioses, eruptive 185
Ringworm 103
River blindness 128,157

S

Salpingitis 240
Scabies 98
Scarlet fever 93
Schistosomiases 150
Scurvy 93
Seborrhoeic dermatitis 219
Seizures 23
Severe acute malnutrition 40
Shigellosis 83,86
Shingles 116
Shock 17
Shock, anaphylactic 17
Shock, cardiogenic 17
Shock, haemorrhagic 17
Shock, hypovolaemic 17
Shock, septic 17
Sinusitis, acute 50
Skin infections, bacterial 105
Skin, necrotising infections 108
Sleeping sickness 139
Staphylococcal pneumonia 72,215
Stings, venomous 283
Stomach disorders 89
Stomatitis 92
Strongyloidiasis 155
Sutures 258
Syphillis 236,245

T

Taeniasis 152
Tehmoiditis, acute 50
Tetanus 170
Threatened abortion 247
Tick-borne relapsing fever 183
Toxoplasmosis, cerebral 217,218
Trachoma 126
Transfusion, blood 38
Tremonematoses 111
Trichinellosis 156
Trichomoniasis 233,244
Trichuriasis 154
Trypanosomiasis, african 139
Trypanosomiasis, american 142
Tuberculosis, pulmonary 78
Typhoid fever 174
Typhus 185

U

Ulcers, genital 236
Ulcers, leg 281
Upper genital tract infections 240
Urethral discharge 231
Urolithiasis 223
Urticaria 117
Uterine rupture 249

V

Vaginal discharge, abnormal 233
Vaginitis 233
Veneral warts 243,245
Venoms 283
Violence, sexual 230,312
Vitamin A deficiency 121
Vitamin C deficiency 93

W

Warts, veneral 243,245
Whooping cough 60
Wound, simple 256

X

Xerophthalmia 121
Xerosis, diffuse cutaneous 219

Y

Yaws 112
Yellow fever 204

In the same collection

Essential drugs - practical guidelines
English, French, Spanish

Obstetrics in remote settings
English, French

Management of epidemic meningococcal meningitis
English, French

Tuberculosis
English, French

Public health engineering in emergency situations
English, French

Rapid health assessment of refugee or displaced populations
English only

Belgium

Médecins Sans Frontières/Artsen Zonder Grenzen
Rue Dupréstraat 94, 1090 Bruxelles/Brussel
Tel.: +32 (0)2 474 74 74
Fax: +32 (0)2 474 75 75
E-mail: info@msf.be

France

Médecins Sans Frontières
8 rue Saint-Sabin, 75544 Paris cedex 11
Tel.: +33 (0)1 40 21 29 29
Fax: +33 (0)1 48 06 68 68
Telex: (042) 214360 MSF F
E-mail: office@paris.msf.org

Netherlands

Artsen Zonder Grenzen
Plantage Middenlaan 14, 1018 DD Amsterdam
Tel.: +31 (0)20 52 08 700
Fax: +31 (0)20 62 05 170
Telex: (044) 10773 MSF NL
E-mail: office@amsterdam.msf.org

Spain

Medicos Sin Fronteras
Nou de la Rambla 26, 08001 Barcelona
Tel.: +34 933 046 100
Fax: +34 933 046 102
E-mail: oficina@barcelona.msf.org

Switzerland

Médecins Sans Frontières
78 rue de Lausanne - Case postale 116 - 1211 Genève 27
Tel.: +41 (0)22 849 84 84
Fax: +41 (0)22 849 84 88
Telex: (045) 421 927 MSF CH
E-mail: office-gva@geneva.msf.org

Achevé d'imprimer en France par ISI, 75020 Paris
Janvier 2010